PROCUREMENT GUIDE: SELECTING A CONTRACTOR/PROJECT DEVELOPER

1. Overview

CHP project development and implementation are similar to many central plant construction projects or comprehensive energy conservation measures. However, a critical distinguishing characteristic of CHP system procurement is the multi-disciplinary nature of the project:

CHP project development requires the services of mechanical, electrical, and structural engineers and contractors; equipment suppliers; a project manager; environmental consultants; and financiers. The acquisition of these services may be through a traditional design-bid-build approach, which can require the host site or owner to provide a high level of oversight and project management. An alternate approach is to contract with a turnkey CHP project developer, who will offer a single point of contact for the end-user and provide all of the above through in-house capability or through subcontracting.

The selection of a contractor or project developer is a critical decision. The facility owner often relies on the contractor or developer to manage the process of transforming a feasible concept into a functioning project. Some owners have the expertise, resources, and desire to lead the development effort on their own, but even in this case, choosing the right contractor can greatly improve the likelihood of project success.

This section provides guidance to owners who are attempting to determine (1) the role that they might take in the development process and (2) the right contractor or project developer to get the project successfully developed, financed, and built. A number of CHP Partners provide both the experience and resources required for successful project development and management. To review a list of CHP Partners, visit www.epa.gov/chp/chp_partners.htm.

From the owner's perspective, there are three general ways to structure the development of a CHP project:[1]

1. ***Develop the project internally***
   This is the traditional design-bid-build approach to project development. The facility owner or host site hires a consultant, plans and manages the design-construction effort, and maintains ownership control of the project. This approach maximizes economic returns to the owner, but also places most of the project risks on the owner (e.g., construction, equipment performance, financial performance) and requires a high level of oversight

[1] This section does not refer to build-own-operate (BOO) projects in which a third party builds, owns and operates the CHP plant and sells heat and power to the user at established rates. The contractor selection process in the BOO case would be very different than the selection for an engineering and/or construction contractor as described in this section. While the selection criteria for BOO partners would include many of the experience and capability qualities outlined in this section, they would also include critical financial terms such as delivered cost of power ($/kWh) and/or thermal energy ($/MMBtu). The BOO option is more fully explained in the "Financing" section of the CHP Project Development Process.

and project management from the owner.

2. ***Purchase a "turnkey" project***
The facility owner selects a qualified project development company to design, develop, and build the project on a "turnkey" basis, turning over ownership and operation of the facility to the owner after commissioning. This option shifts some risk to the developer, at a price, sometimes reducing the economic return to the facility owner or limiting the types of technologies or equipment considered.

3. ***Team with a partner***
The facility owner teams with an equipment vendor, engineering/ procurement/construction (EPC) firm, or investor to develop the project and to share the risks and financial returns under various partnership approaches.

With these structures in mind, a facility owner can determine his or her desired role in the project development process by considering two key questions:

Should the owner self-develop, procure through a turnkey project, or

Find a developer or partner, and determine what kind of company best complements the owner and the project?

The facility owner can answer the first question through an examination of his or her own expertise, objectives, and resources. The second question is more complicated because it entails an assessment of the owner's specific needs and a search for the right developer or partner to complement those needs.

2. The Development Decision

Before deciding whether to develop the project internally, the facility owner must understand the role of the project developer, which is outlined in the box on page 3. Next, an assessment of the owner's objectives, expertise, and resources determines whether or not the owner should undertake project development independently or find a turnkey developer or partner.

A facility owner with the following attributes is a good candidate for developing a project independently:

Willingness and ability to accept project risks (e.g., construction, equipment, permitting, financial performance).

Technical expertise with energy equipment and energy projects.

Funds and personnel available to commit to the construction process.

3. Selecting Contractors and Consultants

Once the decision to develop a project internally is made, the facility owner should review the capabilities of individual contracting firms that meet the owner's general needs. When selecting a contractor, there are several qualities and capabilities that owner should look for, including:

Previous CHP project experience.

A successful project track record.

In-house resources (e.g., engineering, finance, operation), including experience with environmental permitting and siting issues.

Information about individual firm qualifications can be gained from reports, brochures, and project descriptions, as well as from discussions with references, other owners, and engineers. Potential warning signs include lawsuits, disputes with owners, lack of operating projects, and

The Role of the Project Developer

Carry out project scoping—Includes early-stage tasks such as selecting the location for equipment, determining structural and equipment needs, and estimating costs and potential energy savings.

Conduct feasibility analysis—Includes detailed technical and economic calculations to determine the technical feasibility of the project and estimate project revenues and expenses.

Select CHP configuration—Based on the results of the feasibility analysis, select primary equipment and configuration, and contact vendors to assess price, performance, schedules, and guarantees.

Create a financial pro forma—Model the cash flows of the project to estimate financial performance.

Obtain environmental and site permits—Acquire all required environmental permits, interconnection, and site permits/licenses.

Secure financing—Secure financing for the project.

Contract with engineering, construction, and equipment supply firms—Select firms, negotiate terms and conditions, and execute contracts.

Provide overall project management—Provide overall project management services through design, engineering, construction, and commissioning of the project.

failed projects. Published information can be obtained by researching trade literature, through legal information services, and through computer research services.

4. Selecting a Turnkey Developer

Selecting a turnkey developer to manage the development process is a way for the owner to shed development responsibility and risks, and get the project built at a guaranteed cost. In addition, the developer typically provides strong development skills and experience. Other reasons for selecting a turnkey developer include:

- The developer's skills and experience may be invaluable in bringing a successful project online and keeping it operational.

- Many developers have access to financing.

In return for accepting project risks, most turnkey projects cost more than self-built systems. The turnkey option is a good approach if the owner does not want the risk and responsibility of construction. In a turnkey approach, the developer assumes development responsibility and construction risk, builds the facility, and then receives payment when the facility is complete and performing up to specifications. The turnkey approach enables each entity to contribute what it does best: the developer accepts development, construction, and performance risk; and the owner accepts financial performance risk.

5. Selecting Other Types of Project Partners

There are a variety of project development approaches that can lie between (or extend past) developing the project independently or opting for a complete turnkey project. And there are a number of potential project partners to choose from, so the facility owner should look for a partner that provides the best match for the specific CHP project and the owner's in-house capabilities. Three general types of project development partners, listed in order of decreasing scope of services, are:

Pure developer
A firm primarily in the business of developing, owning, and/or operating energy projects. Some developers focus on onsite power projects, while others may be involved in a broad project portfolio of technologies and fuel types. Pure developers usually will own the completed CHP facility, but sometimes a developer will build a turnkey facility.

Equipment vendor
A firm primarily in the business of selling power or energy equipment, although it will participate in project development and/or ownership in specific situations where its equipment is being used. The primary objective of this type of developer is to help facilitate purchases of its equipment and services.

EPC firm
A firm primarily engaged in providing engineering, procurement, and construction services. Many EPC firms have project development groups that develop energy projects and/or take an ownership position.

Ideally, a developer or partner can be identified that fills specific project needs such as the ability to finance the project or supply equipment. Issuing a request for proposals (RFP) is often a good way to attract and evaluate partners. A partner reduces risks to the facility owner by bearing or sharing the responsibilities of project development, although the amount of risk reduction provided depends on the type of partner chosen. For example, a "pure developer" partner will usually take the risk/responsibility of construction, equipment performance, environmental permitting, site permitting, and financing, whereas an equipment vendor partner may only bear the risks of equipment performance.

6. Preparing a Request for Proposals

A facility owner will most likely find it beneficial to issue an RFP for a developer or partner because if the RFP is prepared correctly, respondents will generally offer creative, informative, and useful responses. The RFP process is a good way to screen proposals and focus on the best one(s) for further discussions and negotiation.

An owner who plans on issuing an RFP should carefully examine the needs at the facility and ask respondents to propose ways to meet those needs or solve problems. For example, if ability to secure financing or environmental permits is important, that should also be stated in the RFP. In this way, respondents will be encouraged to offer innovative proposals that meet the project's specific needs. In general, RFP respondents should be asked to provide the following information:

Description of the energy project and available options.

Scope of services being offered (e.g., developer, owner, operator).

Project development history and performance.

Turnkey facility bid (if appropriate).

Technology description and performance data.

Environmental permitting, interconnection, and site permitting plan.

Financing plan.

Schedule.

Operation and maintenance plan.

The RFP should state that the owner reserves the right to select none, one, or several respondents for further negotiation, depending on the proposal's responsiveness to the owner's criteria.

RFPs can be issued for various portions of the project development process, including:

Investment grade feasibility analysis

Equipment

Construction

Engineering (100% design)

Permitting

Maintenance

7. Preparing a Contract

Once the contractor, developer, or partner has been selected, the terms of the project structure will be formalized in a contract. The contract should accomplish several objectives, including allocating risk among project participants. Some of the key elements of a contract include project schedule and milestones, performance penalties and bonuses, and potential remedies and/or arbitration procedures (see the box on page 6). Each contract will be different depending on the specific nature of the project and the objectives and limitations of the participants. Because of this complexity, it is often useful for the facility owner to consult in-house counsel or hire a qualified attorney to serve as a guide through the contracting process.

Elements of an Effective Project Development Contract

Commercial operation date—Date on which the facility will achieve commercial operation.

Milestones—Engineering completion, construction commencement, genset delivery, start-up.

Cost, rates, and fees—Structures include fixed EPC or turnkey price, hourly labor rates, cost caps, fee amount or percentage.

Performance guarantees—Specified output (kW, MMBtu/hr), heat rate, availability, power quality.

Warranties—Output, performance degradation, heat rate, outage rates, component replacement costs.

Acceptance criteria—Testing methods and conditions, calculation formulae.

Bonus amounts and conditions—Bonus for early completion, exceeding specifications.

Penalties and conditions—Damages for late completion, failure to meet specifications.

Integration/impact of construction on facility operations—Schedules for power outages, limits to access, etc.

PROCUREMENT GUIDE:
CHP FINANCING

1. Overview

The decision of whether and how to finance a CHP system is a critical step in the development of a CHP project. CHP systems require an initial investment to cover the cost of equipment, installation, and regulatory/permitting costs; these costs are then typically recovered through lower energy costs over the life of the equipment.

A company might decide to invest in a CHP project if the value of the future stream of cost savings is greater than the up-front investment in equipment. The structure of financing can impact project costs, control, and flexibility, and affect the company's long-term economic health and ability to generate cash. Creative techniques can help spread risk among different participants and help overcome any capital constraints a prospective host may have.

Financial investors have a primary motive that is based on a return on their investment/capital. There are a variety of capital providers in the market, and different investors have different objectives and appetites for risk. The terms under which capital is provided vary from source to source, and will depend on such factors as the lender's appetite for risk, the project's expected return, and the time horizon for repayment.

This section discusses various financing methods for CHP, and identifies some advantages and disadvantages of each. The primary financing options available to CHP projects include:

- Company earnings or internal cash flow
- Debt financing
- Equity financing
- Lease financing
- Bonds (for public entities)
- Project or third-party financing
- BOO options including energy savings performance contracting

CHP projects have been financed using all of these approaches.

2. Financing: What Lenders and Investors Look For

Most lenders and investors decide whether or not to lend or invest in a CHP project based upon its expected financial performance and risks. Financial performance is usually evaluated using a projection of project cash flows over time. Known as a pro forma, this cash flow analysis estimates project revenues and cost over the life of the project including escalations in project expenses, energy prices, financing costs, and tax considerations (e.g., depreciation, income taxes). Thus, preparing an investment grade pro forma is an important step in ensuring the financial feasibility of a CHP project.

A lender or investor usually evaluates the financial strength of a potential project using the two following measures:

Debt coverage ratio
The main measure of a project's financial strength is the host's/owner's ability to adequately meet debt payments. Debt coverage is the ratio of operating income to debt service requirements, usually calculated on an annual basis.

Owner's rate of return (ROR) on equity
Required RORs for internal funds typically range from 12 to 20 percent for most types of CHP projects. Outside equity investors will typically expect a ROR of 15 to 25 percent or more, depending on the project risk profile. These RORs reflect early-stage investment situations; investments made later in the development or operational phases of a project typically receive lower returns because the risks have been substantially reduced.

The economic viability of a particular CHP project is also determined by the quality of

CHP Project Risks and Mitigation Measures

Construction—Execute fixed-price contracts, include penalties for missing equipment delivery and construction schedules, establish project acceptance standards and warranties.

Equipment performance—Select proven, compatible technologies; get performance guarantees/warranties from vendor; include equipment vendor as project partner; ensure trained and qualified operators; secure full-service O&M contracts.

Environmental permitting—Initiate permit process (air, water) prior to financing.

Site permitting—Obtain zoning approvals prior to financing.

Utility agreements—Confirm interconnection requirements, schedule, and fees; have signed contract with utility.

Financial performance—Create detailed financial pro forma, calculate cash flows, debt coverage, maintain working capital/reserve accounts, budget for major equipment overhauls, secure long-term fuel contracts when possible.

supporting project contracts and permits, and by risk allocation among project participants. The uncertainties about whether a project will perform as expected or whether assumptions will match reality are viewed as risks. To the extent possible, the project's costs, revenues, and risk allocation are negotiated through contracts with equipment suppliers, fuel suppliers, engineering/construction firms, and operating firms. The box below summarizes the principal project risk categories (viewed from the beginning of the development process) and presents possible risk mitigation strategies, the most important of which are usually obtaining contract(s), securing project revenues if applicable, and applying for environmental and site permitting early. Potential lenders and investors will look to see how the owner or project developer has addressed each risk through contracts, permitting actions, project structure, or financial strategies.

3. Project Financing Options

3.1 Company Earnings or Internal Cash Flow

A potential CHP project owner may choose to finance the required capital investment out of cash flow generated from ongoing company activities. The potential return on investment can make this option economically attractive. In addition, loan transaction costs can be avoided with self-financed projects. Typically, however, there are many demands on internal resources, and the CHP project may be competing with other investment options for internal funds including options tied more directly to business expansion or productivity improvements.

3.2 Debt Financing

Commercial banks and other lenders can provide loans to support CHP projects. Most lenders look at the credit history and financial assets of the owner or developer, rather than the cash flow of a project. If the facility has good credit, adequate assets, and the ability to repay borrowed money, lenders will generally provide debt financing for up to 80 percent or more of a system's installed cost. Typically, the loan is paid back by fixed payments (principal plus interest) every month over the period of the loan, regardless of the actual project performance.

Debt financing usually provides the option of either a fixed-rate loan or a floating-rate loan. Floating-rate loans are usually tied to an accepted interest rate index like U.S. treasury bills.

For small businesses, the Small Business Administration (SBA) can guarantee bank loans up to $750,000 for energy efficiency projects. The SBA guarantee could improve a borrower's ability to secure a loan.

Another potential source of loans is *vendor financing,* in which the vendor of the CHP system or a major component provides financing for the capital investment. Vendors can provide financing at attractive costs to stimulate markets, which is common for energy technologies. Vendor financing is generally suitable for small projects (below $1,000,000); however, some large vendors do provide financing for larger projects.

Host or facility owners should ask potential developers and equipment suppliers if debt financing is a service they can provide. The ability to provide financing may be a key consideration when selecting a developer, equipment vendors, and/or other partners.

3.3 Equity Financing

Private equity financing has been a widely used method for financing certain types of CHP projects. In order to use private equity financing, an investor must be located who is willing to take an ownership position, often temporarily, in the CHP project. In return for a significant share of project ownership, the investor is willing to fund part or all of the project costs using its own equity or privately placed equity or debt. Some CHP developers are potential equity investor/partners, as are some equipment vendors and fuel suppliers. Investment banks are also potential investors. The primary advantage of this method is its applicability to most projects. The primary disadvantage is its higher cost; the returns to the host/owner are reduced to cover the off-loading of risk to the investor.

Equity investors typically provide equity or subordinated debt for projects. Equity is invested capital that creates ownership in the project, like a down-payment in a home mortgage. Equity is more expensive than debt, because the equity investor accepts more risk than the debt lender. (Debt lenders usually require that they be paid before project earnings get distributed to equity investors.) Thus the cost of financing with equity is usually significantly higher than financing with debt. Subordinated debt gets repaid after any senior debt lenders are paid and before equity investors are paid. Subordinated debt is sometimes viewed as an equity-equivalent by senior lenders, especially if provided by a credit-worthy equipment vendor or industrial company partner.

The equity investor will conduct a thorough due diligence analysis to assess the likely ROR associated with the project. This analysis is similar in scope to a bank's analyses, but is often accomplished in much less time because equity investors are more entrepreneurial than institutional lenders. The equity investor's due diligence analysis will typically include a review of contracts, project participants, equity commitments, permitting status, technology, and market factors.

The key requirement for most pure equity investors is sufficient ROR on their investment. The due diligence analysis, combined with the cost and operating data for the project, will enable the investor to calculate the project's financial performance (e.g., cash flows, ROR) and determine its investment offer based on anticipated returns. An equity investor may be willing to finance up to 100% of the project's installed cost, often with the expectation that additional equity or debt investors will be located later.

Some types of partners that might provide equity or subordinated debt may have unique requirements. Potential partners such as equipment vendors and fuel suppliers generally expect to realize some benefit other than just cash flow. The desired benefits may include equipment sales, service contracts, or tax benefits. For example, an engine vendor may provide equity or subordinated debt up to the value of the engine equipment, with the expectation of selling out its interest after the project is built. The requirements imposed by each of these potential investors are sure to include not only an analysis of the technical and financial viability, but also a consideration of the unique objectives of each investor.

To fully explore the possibilities for private equity or subordinated debt financing, host or facility owners should ask potential developers if this is a service they can provide. The second most common source of private equity financing is an investment bank that specializes in the private placement of equity and/or debt. Additionally, the equipment vendors that are involved in the project may also be willing to provide financing for the project, at least through the construction phase. The ability to provide financing can be an important consideration when selecting a developer, equipment vendors, and/or other partners.

3.4 Lease Financing

Leasing can be an attractive financing option for smaller CHP projects. The operating savings resulting from the installation of CHP—the bottom-line impacts on facility energy costs—are used to offset the monthly lease payments, creating a positive cash flow for the company. Lease financing encompasses several strategies in which a facility owner can lease all or part of a project's assets from the asset owner(s).

Typically, lease arrangements provide the advantage of transferring tax benefits such as accelerated depreciation or energy tax credits to an entity that can best use them. Lease arrangements commonly provide the lessee with the option, at pre-determined intervals, to purchase the assets or extend the lease. Several large equipment vendors have subsidiaries that lease equipment, as do some financing companies.

Leasing energy equipment has become the fastest-growing equipment activity within the leasing industry. The lease payments may be bundled to include maintenance services, property taxes, and insurance. There are several variations on the lease concept, including operating, capital, and leveraged leases.

An ***operating lease*** appears as an operating expense in the financial statement. Operating leases are often referred to as "off-balance-sheet" financing and usually treated as operating expenses. To qualify as an operating lease, the agreement must NOT:

- Transfer ownership of the equipment at the end of the lease term.
- Contain a bargain purchase option.
- Have a term that exceeds 75 percent of the useful economic life of the equipment.
- Have a present value at the beginning of the lease term of the minimum lease payments greater than 90 percent of the fair value at the inception of the lease, using the incremental borrowing rate of the lessee as the discount rate.

Capital lease obligations are reflected on the balance sheet and may be subject to lender or internal capital budget constraints. The general characteristics of a capital lease are:

- It appears on the balance sheet as debt for purchase.
- It requires transfer of ownership at the end of the lease.
- It specifies the terms of future exchange of ownership.
- The lease term is at least 75 percent of the equipment life.
- The net present value of lease payments is about 90 percent of the equipment value.

In a ***leveraged lease,*** the lessor provides a minimum amount of its own equity, borrows the rest of the project capital from a third party, and is entitled to the tax benefits of asset depreciation.

3.5 Project or Third-Party Financing

Project or third-party financing is an approach to obtaining commercial debt financing for the construction of a project in which the lenders look at the credit-worthiness of the project to ensure debt repayment rather then at the assets of the developer/sponsor. Third-party financing can involve the creation of a “legally independent project company financed with non-recourse debt and equity for the purpose of financing a single purpose industrial asset.”[2] This entails establishing a company (e.g., a limited liability corporation) solely in order to accomplish a specific task, in this case to build and operate a DG/CHP facility. Lenders look primarily to the cash flows the asset will generate for assurances of re-payment. Moreover, they are explicitly excluded from recourse to the owners' underlying balance sheets.

In deciding whether or not to loan money, lenders examine the expected financial performance of a project and other underlying factors of project success. These factors include contracts, project participants, equity stake, permits, and technology. A good project should have most, if not all, of the following completed or in process:

- Signed interconnection agreement with local electric utility company
- Fixed-price agreement for construction
- Equity commitment
- Environmental permits
- Any local permits/approval

Lenders generally expect the owners to put up some level of equity commitment using their own money and agree to a fixed-term (8- to 15-year) repayment schedule. An equity commitment demonstrates the owner's financial stake in success, as well as implying that the owner will provide additional funding if problems arise. The expected debt-equity ratio is usually a function of project risk.

Lenders may also place additional requirements on the project owners. Requirements may include maintaining a certain minimum debt coverage ratio and making regular contributions to an equipment maintenance account, which will be used to fund major equipment overhauls when necessary.

The transaction costs for arranging project financing can be relatively high, driven by the lender's need to do extensive due diligence; the transaction costs for a 10 MW project may be the same as for a 100 MW project. For this reason, most of the large commercial banks and investment houses have minimum project capital requirements on the order of $10 to $20 million. Developers of smaller CHP projects may need to contact the project finance groups at smaller investment capital companies and banks, or at one of several energy investment funds that commonly finance smaller projects. Depending on the project economics, some of the investment capital companies and energy funds may consider becoming an equity partner in the project in addition to providing debt financing.

3.6 Build-Own-Operate Options

A final third-party financing form is the BOO option, in which the CHP facility is built, owned, and operated by an entity other than the host and the host purchases heat and power at established or indexed rates from the third party.[3] There are also build-own-transfer projects, which are similar to BOO projects except that the facility involved is transferred to the host after a predetermined timeframe. Such projects may be implemented by an energy services company (ESCO) or sometimes by

[2] Esty, Benjamin. Modern Project Finance: A Case Book. 2004.

[3] This approach is often called “chauffage.”

equipment suppliers and project developers acting as ESCOs.

In a BOO project, the ESCO finances the entire project, owns the system, and incurs all costs associated with its design, installation, and maintenance. The ESCO sells heat and power to the host at a specified rate that offers some savings over current energy expenditures, or can enter into an energy savings performance contract (ESPC) with the host. In an ESPC, the ESCO and the host agree to share the cost savings generated by the project; in return, the ESCO guarantees the performance of the CHP system. An ESPC mitigates the risks associated with new technologies for facility owners, and allows operation and maintenance of the new system by ESCO specialists.

ESPCs are frequently used for public-sector projects. There are no upfront costs other than technical and contracting support. Traditional ESPCs have three components:

- A project development agreement
- An energy services agreement
- A financing agreement

As such, an ESPC is not a financing agreement by itself, but it may contain the financing component. Most lending institutions prefer to see the financing section as a stand-alone agreement that can be sold into the secondary market. This helps create demand for this financial instrument, usually resulting in better pricing.

The host must usually commit to take a specified quantity of energy or to pay a minimum service charge. This “take or pay” structure is necessary to secure the ESPC. The project host gives up some of the project’s economic benefits with a BOO or ESPC in exchange for the ESCO becoming responsible for raising funds, project implementation, system operation, system ownership or a combination of these activities. Some of the disadvantages of this approach to financing include accounting and liability complexities, as well as the possible loss of tax benefits by the facility owner.

3.7 Financing Options for Public Entities

Public sector facilities have additional financing options to consider.

Bonds. A government entity (e.g., municipality, public utility district, county government) can issue either tax-exempt governmental bonds or private activity bonds, which can be either taxable or tax-exempt, to raise money for CHP projects. Bonds can either be secured by general government revenues (revenue bonds), or by specific revenues from a project (project bonds). The terms for bond financing usually do not exceed the useful life of the facility, but terms extending up to 30 years are not uncommon.

The primary benefit of governmental bonds is that the resulting debt has an interest rate that is usually lower (1 to 2 percent) than commercial debt. However, in addition to initial qualification requirements, many bond issuers find that strict debt coverage and cash reserve requirements may be imposed on an energy project to ensure the financial stability of the issuer is preserved. These requirements may even be more rigorous than those imposed by commercial banks under a project finance approach.

To qualify for a tax-exempt governmental bond issue, a project must meet at least two criteria:

Private business use test
No more than 10 percent of the bond proceeds are to be used in the business of an entity other than a state or local government

Private security of payment test
No more than 10 percent of the payment of principal or interest on the bonds can be directly or indirectly secured by property used for private business use.

Federal government facilities. The Federal Energy Management Program (FEMP) of the Department of Energy has signed indefinite quantity contracts with ESCOs on a regional basis for streamlining energy efficiency improvements, including CHP, at federal facilities. The Energy Policy Act of 2005, Section 105, extended the authority for all federal agencies to use ESPCs until September 30, 2016. Realizing that awarding a stand-alone ESPC can be very complex and time-consuming, FEMP created streamlined *Super ESPCs.* These "umbrella" contracts allow agencies to undertake multiple energy projects under the same contract. An agency that uses a Super ESPC can bypass cumbersome procurement procedures and partner directly with a pre-qualified ESCO to develop an energy project. With Super ESPCs, FEMP has already completed the Federal Acquisition Regulations (FAR) procurement process, in compliance with all necessary requirements, and awarded contracts to selected ESCOs. Federal facilities can place and implement a Super ESPC in much less time than it takes to develop a stand-alone ESPC. As a result, Super ESPCs are being used more frequently by federal agencies, and they appear to have largely supplanted stand-alone ESPCs.

Another way for federal agencies to implement efficiency and CHP projects is through partnerships with their franchised or serving utilities. Federal agencies can enter into sole-source *utility energy service contracts* (UESCs) to implement energy improvements at their facilities. With a UESC, the utility typically arranges financing to cover the capital costs of the project. Then the utility is repaid over the contract term from the cost savings generated by the energy efficiency measures. With this arrangement, agencies can implement energy improvements with no initial capital investment. The Energy Policy Act of 1992 authorizes and encourages federal agencies to participate in utility energy efficiency programs offered by electric and gas utilities and by other program administrators (e.g., state agencies). These programs range from equipment rebates (i.e., utility incentives) to delivery of a complete turnkey project. Federal legislation and numerous legal opinions demonstrate that agencies have full authority to enter into utility energy service contracts as well as take advantage of utility incentive programs.

3.8 Capital Cost Effects of Financing Alternatives

Each financing method produces a different weighted cost of capital, which affects the amount of resources required to cover CHP system installation costs. Generally speaking, the financing methods are ranked from lowest cost to highest cost as follows:

- Internal cash flow financing
- Governmental bond financing
- Commercial debt financing
- Project financing
- Private equity financing

Governmental bond financing achieves its advantage through access to low-interest debt. Project finance generally produces a higher financing price because funds are required to pay interest charges as well as ROR on equity. Private equity can be the most expensive option because it usually demands a higher return on equity than project finance, and equity often makes up a larger share of the capital requirement. BOO and ESPC options remove capital financing from the users' responsibilities.

PROCUREMENT GUIDE:
CHP SITING AND PERMITTING REQUIREMENTS

1. Overview

Obtaining the required utility interconnection, environmental compliance, and construction permits is an essential step in the CHP project development process. Permit conditions often affect project design, and neither construction nor operation may begin until all permits are in process or in place. The process of permitting a CHP system will typically take from 3 to 12 months to complete, depending on the location, technology, and site characteristics.

One critical set of requirements are the approvals necessary for connection with the servicing utilities, both natural gas and electric. There are also a number of pre-construction, construction, and operating approvals that must be obtained from a variety of local government jurisdictions for any CHP project. The more involved government approval procedures are those required by the local planning and building departments, fire department, and air quality district. Local agencies must ensure that a CHP project complies with:

- Local ordinances (e.g., noise, set-backs, general planning and zoning, land use, and aesthetics).
- Standards and codes (e.g., fire safety, piping, electrical, and structural).
- Air emissions requirements (e.g., NO_x, CO, and particulate standards).

Approvals may be in the form of a permit or license issued after an agency has verified conformance with requirements, or may be in the form of a program (e.g., landscaping, noise monitoring) that must be developed to ensure that the environmental impacts are mitigated.

The number of permits and approvals will vary depending on project characteristics such as the size and complexity of a project, the geographic location, the extent of other infrastructure modifications (e.g., gas pipeline, distribution), and the potential environmental impacts of construction and operations. Key government agencies and other entities involved would be the city or county planning agency, the fire marshal at the respective fire department/authority, the city or county building department, the environmental health department, the air district, and the local distribution utility.

2. Required Approvals

CHP installations typically require the following types of permits or approvals:

- Local utility company approvals
  - – Electric utility interconnection study and approval
  - – Natural gas connection/supply
- Local jurisdiction pre-construction and construction approvals
  - – Planning department land use and environmental assessment/review

– Building department review and approval of project design and engineering (based on construction drawings)

– Air quality agency approval for construction

Local jurisdiction post-construction and operating approvals

– Planning department and building department confirmation and inspection of installed CHP source

– Air quality agency confirmation that CHP emissions meet emissions requirements

In general, facilities that need a construction permit also require an operating permit.

3. Overall Permitting Process

A typical basic pre-construction/ construction-phase permitting process for a CHP project within any given entity (utility company or government agency) involves three major steps:

1. The owner or developer completes and submits application forms, accompanied by fee payment(s), to the relevant entity.
2. The entity reviews the application for completeness. In this step, the entity and the developer may complete a number of rounds of information exchange before the application is considered complete and accurate.
3. The entity completes its review and issues the relevant approval/permit.

The approval process may also feature one or more meetings between agency or utility staff and the project developer or development team. More importantly, in some states and government agencies, public comment periods are added to Step 2 to allow interested parties to review and comment on the completed application. The comment periods are usually a minimum of 30 days in length. The agency then addresses the comments received, usually explaining why they did or did not incorporate or act on specific suggestions. Public review processes can add months to the approval process.

The post-construction/operating phase adds a fourth step for many state and local government approvals and for utility interconnection approval:

4. The agency/organization confirms that the installation does not deviate from the approved application and/or that it conforms to the applicable requirements, and issues the related approval or permit. This step often involves a site inspection by an agency official. If the agency determines that the project falls short of compliance, the developer takes the steps necessary to bring it into compliance. As in Step 2 above, this may be an iterative process, with a number of rounds of developer corrections and agency re-inspections.

The success of the permitting process relies upon a coordinated effort between the developer of the project and the various entities that must review project plans and analyze their impacts. Project developers might have to deal with separate government agencies with overlapping jurisdictions, underscoring the importance of coordinating efforts to minimize difficulties and delays. There are a number of steps that the developer can take to facilitate the permitting process:

Hold preliminary meetings with key regulatory agencies. Meet with regulators to identify permits that may be required and any other issues that need to be addressed. These meetings also give the developer the opportunity to educate regulators about the project, since CHP technologies might be unfamiliar to regulators.

Develop permitting and design plans early. Determine the requirements and assess agency concerns early on, so permit applications can be designed to address those concerns and delays will be minimized.

Submit timely permit applications to regulators. Submit complete applications as early as possible to minimize delays.

Negotiate design changes with regulators in order to meet requirements. Permitting processes sometimes provide opportunities to negotiate with regulators. If negotiation is allowed, it may take into account technical as well as economic considerations.

4. Utility Interconnection Requirements

These include the technical and contractual requirements for interconnection to the local electricity grid for those systems that will operate in parallel with the utility. "Parallel with the utility" means the CHP system is electrically interconnected with the utility distribution system at a point of common coupling at the site (common busbar), and facility loads are met with a combination of grid and self-generated power. Interconnection requires various levels of equipment safeguards and utility approvals to ensure that power does not feed into the grid during grid outages.

Historically, negotiating the technical and contractual requirements for parallel grid interconnection has often been problematic for CHP installations. Each utility has had its own specific requirements that have sometimes appeared to be arbitrary, overly complicated and prohibitively expensive. The situation is improving, however: regulatory intervention, agreement standardization and equipment certification initiatives at the federal and state levels are helping to provide better definition and certainty to both the technical and contractual requirements for interconnection approval.[4] Streamlining and standardization of interconnection is being promoted with the intent that small, low-impact CHP projects can be reviewed quickly and cost-effectively, and the technical and equipment requirements will be only as complex and expensive as required for safe operation.

While standardization of the technical and contractual requirements for parallel grid interconnection is not yet nationwide, the approval process typically includes the following steps:

1. ***Application***
   A formal application is filed with the servicing electric utility. This application usually asks for information on the location, technical and design parameters, and operational and maintenance procedures for the planned CHP system. The level of detail required

[4] A number of states have developed streamlined procedures and established timelines for interconnection approval for systems below certain capacity levels (New York, Texas, and Delaware among others); Both the Federal Energy Regulatory Commission (FERC) and the National Association of Regulatory Utility Commissioners (NARUC) have issued proposed rules and/or model guidelines that would promote standardized interconnection procedures and business terms for small distributed generation resources connected to the grid; IEEE 1547 has been issued, providing a "Standard for Interconnecting Distributed Resources with Electric Power Systems" that addresses the performance, operating, testing, and safety requirements of interconnection hardware and software.

and application fees can vary considerably from one utility to another.

2. ***Interconnection studies***
   There are a number of technical interconnection studies that might or might not be required, depending on the size and configuration of the CHP system and the specific requirements of the servicing utility:

   – *Minimum engineering review.* Designed to identify any adverse system impacts that would result from interconnection of the CHP system. Examples of potential negative impacts to the grid include exceeding the short circuit capability of any breakers, violations of thermal overload or voltage limits, and inadequate grounding requirements and electric system protection.

   – *System impact study.* Required if any adverse impacts are identified in the minimum engineering review. Designed to identify and detail the impacts to the electric system operation and reliability of the proposed CHP system, focusing on the potential adverse system impacts identified in the engineering review.

   – *Facility study.* Might be required if the system impact study indicates that grid system reliability would be adversely affected by interconnection of the CHP system. This study would identify and design any required facility or system upgrades that might be necessary to maintain grid integrity.

   The costs of the studies are typically paid by the applicant, but can be negotiated with the utility. It is important to execute specific agreements with the utility if specific studies are required. These agreements should outline the scope of the study and requirements and include a good faith estimate of the cost to perform the study.

3. ***Interconnection agreement***
   There are also contractual issues that must be addressed in parallel to the technical requirements for interconnection. The interconnection agreement will cover such issues as back-up services, metering requirements, inspection rights, insurance requirements, and the responsibilities of each individual party.

4. ***Power purchase agreement***
   If sales of excess power to the grid are contemplated, the terms and conditions of power purchases would be contained in a separate power purchase agreement (PPA) between the utility and the site. Primary considerations for a PPA include:

   – *Term.* The contract term should be sufficient to support financing and/or the life of the project. A typical term can be 10 years or more.

   – *Termination grounds.* The grounds for contract termination should be limited in order to protect the long-term interests of all parties.

   – *Assignment.* The contract should consider assignment for purposes such as financing or changes in ownership.

   – *Force majeure.* Situations that constitute force majeure (e.g., storms, acts of war) should be identified and agreed upon; otherwise this clause could be used to interrupt operations or payment.

   – *Schedule.* There should be some flexibility allowed for meeting milestone dates and extensions (e.g., in penalty provisions such as non-performance).

This provision is necessary in case unforeseen circumstances cause project construction delays.

– *Price.* The value of sales of power to the grid will typically be based on the utility's avoided cost or some negotiated rate, either of which will be close to the wholesale commodity costs for power (i.e., not the higher retail rate displaced by power used on-site). Many utilities have a standard offer contract for FERC qualifying facilities.[5]

The utility should establish a definitive period of time in which to process the application and studies, and provide one of the following notifications to the applicant:

Approval to interconnect.

Approval to interconnect with a list of prescribed changes to the CHP system.

Justification and cost estimate for prescribed changes to distribution systems that are required to accommodate the CHP system.

Application rejection with justification.

The time period for the review and approval process can vary depending on the number and level of studies required and the organization of the utility itself. Some utilities have assembled a handbook of procedures, options, and draft contracts. In these cases, the procedures will be relatively orderly and straightforward, and the process will be expedited. Other utilities have dispersed the responsibilities. In such cases it will take time to determine the right contacts and all the specific interconnection requirements. States that are streamlining the interconnection process have targeted a time period of 4 to 6 weeks for review and completion of a simple interconnection application. In general, the larger the project, the more complex the interconnection scheme; if there are specific issues with the section of the grid being accessed (e.g., rural lines or weak distribution areas), the higher the costs both for studying the interconnection configuration and for the necessary electrical equipment to interconnect.

It is recommended that the local utility be contacted early in the project development process in order to identify interconnection requirements and potential issues. A useful starting place for a potential applicant is to identify existing onsite generation systems that have already been connected with the utility and gather information on their requirements and application process. The EPA CHP Partnership can often help identify such sites.

5. Local Zoning/Planning Requirements

Project siting and operation are governed by a number of local jurisdictions. It is

[5] In 1978, the Public Utilities Regulatory Policy Act (PURPA) required an electric utility to buy electricity from power projects that are granted Qualifying Facility (QF) status by FERC. Under this provision, the electricity would be bought at the utilities' current avoided cost rate. However, the federal Energy Policy Act of 2005 amended PURPA; for new contracts, utilities are no longer required to buy or sell excess power from QFs if the cogeneration facilities have access to transmission services and wholesale markets.
In 2006, FERC issued a proposed rule to repeal the mandatory purchase obligation in Day 2 Regional Transmission Organization (RTO) territories: Midwest ISO, PJM, ISO New England, and NYISO. At the time of this writing, FERC has not issued a final rule. For Day 1 RTOs or markets of comparable competitive quality, the mandatory purchase obligation will be evaluated on a case-by-case basis.
A power project is granted QF status as either a "small power producer" or a "qualifying cogenerator" after meeting certain fuel or efficiency requirements, as amended by FERC in 2006 (see FERC Docket No. RM05-36-001; Order No. 671).

important to work with the appropriate regulatory bodies throughout all stages of project development in order to minimize permitting delays that cost both time and money. Applicable local agencies include:

County and city ***planning bureaus*** govern land use and zoning issues. They may conduct environmental impact assessments, including noise studies, and are responsible for compliance with local ordinances. For example, most local zoning ordinances stipulate the allowable decibel levels for noise sources and these levels vary, depending on the zoning classification at the site. The local zoning board or planning bureau determines whether or not land use criteria are met by a particular project, and can usually grant variances if conditions warrant.

State and local ***building and fire code departments*** address CHP-related safety issues such as exhaust temperatures, venting, natural gas pressure, fuel storage, space limitations, vibration, gas and steam piping, and building structural issues. Building departments are often part of a city's planning division. Most CHP projects require a building permit.

The ***environmental/public health department*** looks out for public health and safety, focusing on hazardous materials and waste management requirements.

Water/sewer and public works authorities rule on water supply and discharge matters. Typically, they ensure that a project is compliant with the federal Clean Water Act; decide whether local water and wastewater quality standards will be or are being met; and evaluate waste streams that empty into lakes, rivers and other bodies of water.

6. Local Air Quality Requirements

Air quality agencies/districts at the state and local levels are responsible for administering air quality regulations, with a primary focus on air pollution control. The primary criteria pollutants of concern include NO_X, CO, SO_2, particulates, and certain hazardous air toxics. Local air agencies ensure that a project complies with federal and state Clean Air Act mandates. These authorities issue construction permits based on their review of project design and performance objectives. After construction and installation is complete, projects receive operating permits based on emissions performance relative to applicable emissions thresholds. Issues that air agencies consider include exemption thresholds[6] (e.g., capacity, emission levels), controlled emission levels, type of fuel(s) fired, proximity to sensitive receptors (e.g., schools, day cares, hospitals), siting at a new location or an existing site (e.g., commercial building, industrial facility), and a demonstration that projected emission levels are met via source testing.

Major characteristics that typically differentiate projects for air permitting purposes include:

Does the CHP system trigger permit requirements? If it is not exempt, what relevant emissions threshold is it below or above?

[6] Agencies typically have a rule for which equipment and processes are exempt from permitting, a rule that is often based on whether the equipment falls below a given emissions threshold. Exemptions may also exist based on the type or function of the equipment, e.g., if it is emergency standby generation or a fuel cell installation, or if it has been precertified.

Is the site in an attainment area?[7] Non-attainment areas feature more rigorous guidelines.

Is the site an existing or new facility? Is the site currently considered a major emissions source or a minor emissions source? Adding a new source of emissions to an existing major source can trigger additional permitting requirements; adding a new source to an existing minor source may move the facility into the major source category.

Do emissions of criteria pollutants and air toxics affect surrounding communities? If it appears that the source's emissions may affect public health, air quality modeling or an evaluation study may be necessary.

Up-to-date information on state emissions requirements for CHP and other onsite generation systems can be found at:

www.eea-inc.com/rrdb/DGRegProject/index.html

7. Permitting Costs

Siting and permitting can require significant investments of time and money in researching, planning, filing applications, meeting with officials, and paying fees. Interconnection, environmental regulatory, and local government agency approval costs may approach 3 to 5 percent of project costs for smaller systems and need to be included in any CHP project economic evaluation. Equipment needed to ensure compliance, such as air pollution control equipment or noise abatement equipment, would be in addition to these fees.

[7] When an area does not meet the air quality standard for one of the criteria pollutants (ozone, nitrogen dioxide, carbon monoxide, sulfur oxides, particulate matter, and lead), it may be subject to a formal rule-making process that designates it as in "nonattainment." The Clean Air Act further classifies ozone, carbon monoxide, and some particulate matter nonattainment areas based on the magnitude of their problems. Nonattainment classifications may be used to specify what air pollution reduction measures an area must adopt, and when the area must reach attainment. The technical details underlying these classifications are discussed in the Code of Federal Regulations, Part 81 (40 CFR 81) and on the U.S. EPA Web site: *www.epa.gov.*