



Advanced Automated HVAC Fault Detection and Diagnostics Commercialization Program

**California Energy Commission
Contract # 500-03-030**

D7.2a – Technology Transfer Template

April 27, 2005

Submitted To:
Accounting Office, MS-2
California Energy Commission
1516 Ninth Street, 1st Floor
Sacramento, CA 95814

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PIER Advanced Automated HVAC Fault Detection and Diagnostics Program

California Energy Commission
Contract # 500-xx-xxx

Technology Transfer Plan For Project **X.X** **[insert project title]**

Deliverable **x.x.x**

[insert date of your plan]

Submitted To:
Accounting Office, MS-2
California Energy Commission
1516 Ninth Street, 1st Floor
Sacramento, CA 95814

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List of Tables

(may be inserted as needed)

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Notes on Using this Technology Transfer Plan Template:

- This template is provided to help you produce a good and quick Technology Transfer Plan. Complete what you can, indicate your current thoughts on other items, and insert any comments or questions that would help refine the template itself.
- The first section focuses on making the business case for the product BEFORE describing the plan for its commercial introduction. This first “action item” is essential. It provides the rationale for arguments to move the product past the barriers in the path to market. An economic justification should be possible even if assumptions (clearly identified) are needed for some key variables.
- It is important that project managers think broadly about their product's benefits. Sometimes the key determinants of value have little or nothing to do with energy efficiency; some users may value an FDD product for its O&M cost saving properties, worker safety, productivity enhancement, or status as an innovator.
- Most FDD products are only components of larger products or systems. In such cases only the most general economic case can be made—but the attempt should be made, including clearly identified assumptions for the unknowns.
- This template suggests the main types of tech transfer activities needed to capture the current views of the product developers for the consideration of manufacturers and other key actors. The intent here is to encourage the developer to think through the process and to develop a full vision of the product's necessary path to the market. You are not expected to know all the specific policy interventions, media, messages, channels, timing, expenditures, and division of responsibilities but where these details can be described now, they should be.
- The template is a work product of the FDD Market Connection Project under management of the New Buildings Institute. Please contact Alan Cowan at New Buildings Institute (509-493-4468x17, acowan@newbuildings.org) with any questions or comments.

Technology Transfer Plan

Fault Detection and Diagnostics Commercialization Program

For Project **X.X**

[insert project title]

Introduction

This is one of a series of Technology Transfer Plans in the PIER Advanced Automated HVAC Fault Detection and Diagnostics Commercialization Program (FDD). In the FDD, “technology transfer” is defined broadly to mean everything needed to move the product from its current developmental state to successful market introduction. Each of the FDD’s technology transfer plans addresses one of the FDD’s technology or protocol products, and provides an overview of the product’s development status, markets, and business case. Most importantly, it identifies specific actions recommended to encourage the product’s production and successful market introduction in California.

The template contains five sections:

- Product Overview
- Business Case
- Market Analysis
- Product Development Status and Needs
- Technology Transfer Actions

The Business Case section is to be completed along with the accompanying spreadsheet.

The template is a work product of the FDD Market Connection Project. The project manager is Alan Cowan, New Buildings Institute. Additional staff support was provided by Cathy Higgins and David Weigand.

Product Overview

Product Description

What is this product, in a single sentence? And is it a complete end-use product or system, a separate component for the OEM market, a protocol or standard, or something else?

(Include a photo and/or diagram if readily available)

Function and Features

What HVAC function does this product serve? For what general markets and uses? If it’s a component, what ultimate products will incorporate it, and for what purposes? What are its main features?

Business Case

This section presents an economic analysis to demonstrate the product's value for the manufacturer, the consumer and the State of California. An **Excel spreadsheet template** is provided separately as an easy way for you to do the minimum calculations needed; you can refine the methodology as needed. Each tab in the spreadsheet represents a single building sector. You may delete the tabs corresponding to building types that are not relevant for your FDD product. On each tab, light yellow shading signifies the input fields. The paragraphs below will lead you through the spreadsheet and also give you a place to explain the reasoning behind your numeric assumptions in the calculations.

Product Scenarios

For most products, you probably won't be able to predict the "right" combination of key features and market applications. Therefore it's usually important to define more than one scenario so that you can at least bracket the range of possibilities. For instance, there are both new and replacement markets, each with different installation costs and integration issues as well as competing products (for new construction) and existing systems (retrofit).

The market sizes and absorption rates also differ and have their own uncertainties. All these differences have big effects on the economics. But there's no need to try to analyze every possibility—just to show the effects of the main uncertainties. Imagine that you're trying to convince a manufacturer to invest in making and selling the product, and do only what you think it would take to demonstrate an attractive business case.

Spreadsheet Workflow

Following are instructions for starting at the top of the spreadsheet and working your way down the sheet. Underlined text identifies areas requiring spreadsheet inputs. In addition, provide assumptions and data sources for your values below. An example has been provided on the Small Office spreadsheet.

Building Electricity Savings

- **Bldg. & HVAC Loads:** Default values are provided for each of the building sectors. The data source is "California Energy Demand, 2000-2010", California Energy Commission, Publication # 200-00-002. July 14, 2000.

Estimated (Percent) Savings: Insert your estimated electrical savings for heating, cooling and ventilation in these rows. It is likely that you will have a range of savings and multiple scenarios will be developed around these values.

- How were your savings estimates derived? Provide information on the calculation procedures, range of values and confidence in the values.

Savings: Energy savings are calculated based upon the building loads and the anticipated percent energy savings

Customer Benefits

Customers cost savings are calculated for representative buildings. Input the installed cost of the product and the building size for the scenario. It may be necessary to provide multiple scenarios for a range of product costs and for a couple of building sizes if the product cost is not linear with building size.

- What is the basis for your product cost? Provide information on hardware versus installation costs.
- What manufacture markup has been used?

Base Building & FDD Equipped Building: Depending upon the size and type of the building, the O&M may be handled by onsite personal, service contractors, or a combination of both. Provide estimates of onsite staff and contract costs. If you are only able to estimate the labor and contract savings, input these values for the base building and enter zeros for the FDD building.

- What is the basis for your cost savings?

Annual Savings: Annual energy and costs savings along with a simple payback shown based on the previously entered information.

Statewide Product Impact

To estimate statewide product impact, market size and penetration need to be estimated. For each building type, estimate the portion of those buildings that use a HVAC system type compatible with the FDD product. Provide an estimate of the market penetration for the first year the product is on the market and the rate of increase in market penetration for each year afterwards (up to year 10).

- What is the basis for your market size and penetration estimates?
- How did you estimate the rate of increase of market penetration?

Statewide Construction Forecast

Default values for the total new construction are provided and are based on California Energy Commission data.

Statewide Energy Savings

Based on the supplied data, statewide energy and energy cost savings are estimated for year one and the cumulative 10-year savings.

Non-Energy Benefits to Consumer

If applicable, list the non-energy benefits that may have value to the user, such as maintenance costs, improved HVAC system life, indoor air quality. Estimate the value of the benefits, if possible, as these savings may be very important for some markets and products, and may be the key to a successful marketing strategy.

Market Analysis

Market Segmentation, Size and Price Effects

There may be a variety of markets for some FDD products, with increasingly large total sales (and energy savings) at progressively lower prices. If applicable, estimate the market segmentation and sizes for different product price points (graph or table). Consider California, regional, and national or international markets separately as appropriate. Compared against your best estimates of product costs and required margins, how does the price affect the total market size? Could efforts to reduce the product's price significantly increase its market?

Market Size versus Annual Sales

Obviously not everyone in the estimated target market will buy the product. Provide your reasoning on how the market size translates into an annual sales trajectory over at least the first few years. Also estimate the eventual sales based on likely total penetration rate.

The Buyer and Other Influencers

Who makes the buying decision for this type of product? Who are the other major influencers?

The Competition

What are the principal competing products, and how does this product have an advantage over that competition? How entrenched is the competition and what are its advantages that must be overcome?

Uncertainties

Identify intangible factors such as new-technology risk, warranty protection, buyer support, etc., that could affect the buyer's perception of value.

Consumer Choice Barriers

For this product, what are the principal issues for the buyer and key influencers? (some possibilities: initial cost, O&M costs, energy savings, non-energy features, competition, availability, visibility in market, reliability, longevity, warranty, ease of specification, liability).

Product Development Status and Needs

Product Development Status

What is the current state of this product's development? Where will it be at the end of this project?

Remaining Steps to Market Readiness

What remains to be done before it is market-ready? Describe briefly.

Codes and Standards

Do the product's energy saving and cost advantages depend on any current or scheduled code requirements? Are these code requirements likely to change? Conversely, are any new code requirements needed to encourage the adoption of this product? What needs to be done to promote those requirements, by whom, and are there any critical time deadlines?

Manufactures Status

Who will initially produce and market this product? How firm is their commitment? If there is no current manufacturing partner, what steps have been taken to find one? (see Additional Manufacturer Commitment in the next section for planning to do this, if needed)

What are the crucial criteria to assure the manufacturing partner's continued commitment? What are you committed to do to get an interested or involved manufacturer to go all the way to production of this product? What else must others do?

How soon is the manufacturer likely to introduce this product to the market, after production engineering, costing, tooling, initial production, and distribution and marketing arrangements? What is the expected rollout strategy, if known?

Related and/or Competing Products under Development

Many of FDD products will be used directly by manufactures that are currently developing their own FDD capabilities. What are related FDD products under development by manufacturers and what benefit/barriers might exist due to the development of additional FDD type products?

Technology Transfer Actions

For each of the following paragraphs keep in mind these guidelines: What activities are planned for completing during the FDD contract? After the contract? Who is responsible for completing these tasks? Please also provide a schedule of these activities.

Additional Manufacturer Commitment

If additional manufacturers are required, describe how they will be identified and approached? If known, who are prime candidates? What will be done to encourage their commitment, and by whom? For instance, how will this plan's proposed business case be used? Can other influencers help in convincing manufacturers? Who will approach them and how?

Purchase Incentives

(Refer back to Business Case section for basic cost data) Are rebates or other incentives required to make this product competitive? These include direct incentives as well as mandated codes and industry standards. What is the plan for proposing and achieving such incentives? Who will lead this effort, and how? What timing is possible?

Educating HVAC Engineers, Designers and Specifiers

What efforts in product introduction are needed to promote awareness and understanding among HVAC equipment specifiers? Who will be doing it? What type of material (early case-study applications, journal articles, conference presentations, spec sheets, brochures, press announcements, trade ads, education for manufacturing reps and distributors, trade show exhibits, etc.) is needed?

Other Intermediaries

Who might hold up or advance the success of this product? Are there influential actors who must be encouraged? These might include distributors, manufacturers' agents, and local building code enforcers, for example. For this product, how important are these efforts, how will they be done, and by whom?

Tools: Design and Specification Aids

Are design and specification aids needed, such as computerized or written guides for sizing and energy-cost savings calculations? Are guides needed on integrating the product into different HVAC systems and controls? If so, what is needed and who should develop it for these products? What is it likely to cost, and is this viable? (Note that this information will be helpful in focusing the FDD's own project on design tools.)

Media: Papers, Presentations and Press Releases

What specific papers, presentations and press releases are needed? Describe the overall media approach. List event names and dates to the extent possible.

Other Outreach Actions

What other outreach efforts are needed to speed market adoption? Additional field demonstrations? Implementation of code changes? (etc.)