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THE ENERGY-RELATED INVENTIONS PROGRAM: EVALUATION CHALLENGES AND SOLUTIONS

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ABSTRACT

This paper describes the results of an evaluation of the Energy-Related Inventions Program (ERIP), focusing on the methodological challenges faced by the evaluators and the solutions implemented to ensure the evaluation's integrity. Operated jointly by the U.S. Department of Energy and the National Institute of Standards and Technology, ERIP is one of the longest running commercialization assistance programs in the United States. The program has been subjected to a series of evaluations since 1980 that have generated data describing the progress of 464 ERIP-technologies technologies.

The performance metrics produced by the evaluation suggest that ERIP is a cost-effective federal investment. By the end of 1994, 24% of the ERIP technologies had entered the market, generating total cumulative sales of $961 million (in 1994–$). With $124 million in program appropriations from 1975 through 1994, ERIP has an 8:1 return in terms of sales to program costs. At least 757 job-years were directly supported by ERIP technologies in 1994, and 6,646 job-years of employment have been created over the past decade. The sales and employment supported by ERIP technologies are associated with $4.4 million in 1994 federal tax returns.

Many issues must be addressed to fairly appraise public investments in technology commercialization programs. These include: (1) the need to track the progress of program participants for extended periods; (2) complexities associated with accounting for spinoff technologies; (3) determining the external and internal validity of program evaluations; and (4) dealing with performance data that are dominated by a small number of highly successful technologies.

DISCLAIMER

THE ENERGY-RELATED INVENTIONS PROGRAM: EVALUATION CHALLENGES AND SOLUTIONS

Over the past 15 years, numerous federal and state programs have been created to spur the development of technology-based new companies by providing commercialization assistance. The Energy-Related inventions Program (ERIP) is one of the first programs to offer such assistance to small business and independent inventors, and its continuous operation since 1974 makes it one of the most long-standing commercialization assistance programs in the United States. The performance of ERIP is the subject of this paper.

Since the program's inception, evaluators have systematically monitored the progress of the inventions it has supported. Case studies of ERIP inventions have been completed (Rorke and Livesay, 1986; Brown, et al., 1993; Livesay, Lux, and Brown, 1996), and the economic, energy, and environmental impacts of the Program have been quantified (Brown, et al., 1994). Past evaluations also have examined characteristics of the technologies, inventors, markets, and business strategies that have contributed to commercial success. This paper presents the results of the latest quantitative evaluation of the Energy-Related Inventions Program, focusing on the methodological challenges faced by the evaluators and the solutions implemented to ensure the the evaluation's integrity.

BACKGROUND

Established in 1974 under the Federal Nonnuclear Energy Research and Development Act (P.L. 93-577), the Energy-Related Inventions Program is directed to assist the development of nonnuclear energy-related inventions with outstanding potential for saving or producing energy, "particularly those submitted by individual inventors and small companies." The goal is to help individual and small company inventors with promising technologies develop their inventions to a stage of development that would attract the investment necessary for private sector commercialization. Many of these technologies face significant market and industry barriers that reduce their ability to attract early funding and intensify the difficulties of product development. Individual and small business inventors often lack the business experience needed to surmount these hurdles.

Anyone can submit an invention at any stage of development to the program for a free, confidential evaluation. The legislation provides for the National Institute of Standards and Technology (NIST), previously called the National Bureau of Standards (NBS), to evaluate the inventions submitted, assessing them for technical feasibility, energy conservation or supply potential, and commercial possibilities. Only 2% of the inventions pass through the screening

process and are recommended to the U.S. Department of Energy (DOE) for technical and financial support.

DOE grants are provided to most of these recommendees to pay for technical research, prototype development, testing, and a variety of other activities that help move the technologies one step closer to the market. In addition, ERIP conducts Commercialization Planning Workshops for inventors in the program. These Workshops were initiated in 1986, when it became clear from previous program evaluations that many inventors were failing in the marketplace because of their lack of business acumen. To find inventors and encourage innovation, ERIP holds several National Innovation Workshops each year in different regions of the country, jointly sponsored by local businesses, inventor organizations, and universities.

Since the program's 1974 beginning, more than 31,000 inventions have been submitted to NIST for evaluation, and more than 625 of these have been recommended to DOE for support. Seventy-eight percent of these recommendees have received DOE grants averaging $78,000 (in current dollars). Approximately half of the program's funding is spent by NIST to conduct the technical evaluation of applications to the program, 15% is for DOE's program office (to support its Workshops, technical assistance, grant processing, and program evaluation), and 35% goes toward new grants. These proportions can vary from year-to-year depending upon program needs.

EVALUATION DESIGN

A program such as ERIP has an impact on diverse stakeholder groups (including independent inventors, the business community, policy makers, and taxpayers), each of which evaluates the program's success in different ways. Inventors want to know the benefits of program participation in terms of technical assistance, commercialization planning, and help with the subsequent acquisition of funding. The business community might want to know about the relationship between the program and the creation of viable businesses, and would likely evaluate ERIP-supported technologies in terms of profit margins, sales levels, return-on-investment, or comparative advantage. Policy makers are concerned about whether the program meets its objectives of conserving or producing energy, the creation of new businesses and employment, and the development of promising new energy technologies. Taxpayers are most concerned about the relationship between program costs and the extent to which these costs are counterbalanced by economic returns and other benefits to the nation. This evaluation attempts to address at least some of the concerns of all of these stakeholder groups.

Sample Selection

Through 1993, a total of 609 inventions were recommended to DOE's Energy-Related Inventions Program by NIST, which screens all submitted inventions in terms of technical merit, likelihood of commercial success, and potential energy impact. Previous evaluations of the Program concluded that data could no longer be obtained for 159 of these inventions due to the deaths of several inventors, incomplete addresses, and refusals to participate in surveying. To reduce the cost of data collection while maximizing the coverage of successful ERIP technologies, a sampling design involving two subsamples was employed. The first subsample included 98 inventions identified by past research and key informants to be most promising in terms of market entry and commercial success. The second subsample contained the remaining 352 inventions. An attempt was made to reach all 450 inventors, but a special effort was made to contact the subsample of 98 promising inventors.

A 14-page questionnaire was developed to collect sales, employment, fund-raising, and other data through 1994. Altogether 171 of the 450 participants returned their questionnaires by mail as a result of these two mailings. The response rate for the promising inventions (40 out of 98 or 41%) was higher than the response rate for the other inventions (131 out of 352 or 37%). The 58 nonrespondents from among the promising inventions were targeted for follow-up telephone interviews. Forty were completed. The other 18 either could not be located or refused to participate in the surveying.

In total, data were collected in 1995 on 211 inventions, or 47% of the 450 ERIP inventions. Historic information from previous evaluations is also available for 253 additional inventions, and this information is used in various analyses throughout this paper. To illustrate, an inventor who reported sales during the 1985 evaluation would still be included in the cumulative count of inventions that have experienced sales, even if further information were not obtained in subsequent evaluations. Altogether, some evaluation data are available for a total of 470 of the 609 inventions.

Several of the analyses presented in subsequent chapters of this report draw exclusively on information collected in 1995 for the sample of ERIP technologies. For instance, descriptive statistics on the level of effort currently being dedicated to developing the ERIP inventions are based on this limited sample. Most of the analyses, on the other hand, are cumulative in nature and capitalize on the full database of 470 technologies—211 from the 1995 sample and 253 from previous years of data collection. Thus, measures of cumulative sales and the employment impacts of ERIP technologies rely on this larger base of data.

Internal and External Validity of the Evaluation

Program evaluations are often judged in terms of their internal and external validity

(Campbell and Stanley, 1971). Internal validity refers to the validity of the estimated program impacts for the sample selected. Are the impacts attributable to the program, and can alternative explanations be ruled out? External validity refers to the ability of the sample-based results to be extrapolated to one or more larger populations. Is the sample representative, and can results be extrapolated to other participants, or to next year's participants? Each of these types of validity is discussed below.

The evaluation design does not involve a control group against which the progress of ERIP inventions can be compared. Rather, the literature at large is relied upon for insight into the invention and innovation process as it occurs without government intervention. In addition, in 1994, a test for internal validity was conducted that compared ERIP technologies to a sample of 79 inventions labelled "program referrals" (Brown, Curlee, and Elliott, 1995). Program referrals were inventions that had been denied ERIP support despite their technical merits and market potential, because they did not offer sufficient energy-related benefits. The results indicated significant differences in terms of several indicators of commercial success. These findings supported the supposition that ERIP technologies enjoy greater success than program referrals, and that ERIP technologies achieved their considerable commercial success at least in part because of the support provided by the Program.

No analysis of external validity was conducted in this 1995 evaluation. In the previous evaluation (Brown, et al., 1994), however, an analysis of nonresponse bias was completed as a partial test of internal validity. In particular, a sample of 11 nonrespondents was interviewed to determine whether or not it was feasible to generalize from responding participants to the entire population of participants. It was found that the sample of 11 nonrespondents was similar to the "other" inventors (i.e., those that were not flagged as "promising") in terms of the stage of development of their technologies and the incidence of sales and licensing. However, they were markedly different in terms of activity status: none of the 11 nonrespondents were actively pursuing the development of their ERIP technologies when interviewed in 1993 (compared to 63% on the other inventors). Thus, it was concluded that generalizations from respondents were justifiable only for indicators that measure progress to date, and not on measures of current activity or likely future progress.

Thus, as is true of most innovation program evaluations (Roessner, 1989), a precise assessment of the net benefits of the Energy-Related Inventions Program is beyond the reach of this evaluation. The approximate benefits identified in the evaluation, however, are considered to be credible. Further, the fact that six quantitative evaluations of ERIP conducted over the past decade have produced consistent indicators of commercial progress, supports the view that the evaluation designs have been robust.

MARKET ENTRY OF ERIP INVENTIONS

Significant progress has been made by ERIP inventions in terms of movement from concept development and laboratory experiments to prototype development and entry into the marketplace. By the end of 1994, 144 ERIP inventions are known to have achieved sales. This represents 24% of the population of 609 ERIP technologies, which is similar to the estimate of 23% provided by the 1993 evaluation. Both figures are probably underestimates of the true percentage, since we were unable to collect information on all of the technologies.

The 24% success rate compares favorably with the success rates of technological innovations as a whole. The widely cited Booz-Allen & Hamilton studies (Booz-Allen & Hamilton, 1982), for instance, reported that despite considerable investments in up-front stages of exploration, screening, and business analysis, it still takes seven new product efforts to get one product to market–that is, only 14% of new products are successfully introduced. This suggests that ERIP inventions are at least as successful as technological innovations generally, though meaningful comparisons are difficult to make because of differences in products, technologies, and measures of success. The literature has reported success rates ranging from 1% to 85% (Cooper, 1983; Crawford, 1987). Venture capitalists derive their profits from the one or two successes that offset the costs associated with nine or ten losers (Florida and Smith, 1993). Based on that comparison, ERIP inventors are performing remarkably well.

Another way to quantify commercial success is by comparing the number of ERIP technologies that have experienced sales to the cost of the Program. From 1978 through 1994, ERIP expended $82 million (in current dollars). At least 144 of the technologies it has supported have entered the market. Similar statistics are available for (1) the Gas Research Institute (GRI), which has operated an R&D program since 1978, and (2) the European Community (EC), which has operated a promotion and exploitation program since 1968 (*Chemistry and Engineering News*, July 8, 1991). By early 1991, 111 new or improved products, processes and techniques had been sold or were in commercial service, due to GRI's R&D budget of $1.41 billion (Dombrowski, et al., 1991). By 1990, approximately 50 inventions supported by the EC had been put on the market as the result of several billion dollars of R&D funding. ERIP's accomplishments compare favorably with both of these other programs.

SALES OF ERIP TECHNOLOGIES

It is estimated that the total cumulative sales of ERIP technologies from 1980 through 1994 is $774 million in current year dollars; this translates to nearly one billion (i.e., $961 million) of cumulative sales in 1994 dollars. The impressiveness of this number is underscored

when it is compared to the sales performance of the Small Business Innovation Research (SBIR) Program, a much larger federal commercialization assistance program. Between 1983 and 1993, 11 federal agencies gave nearly 25,000 SBIR awards worth over $3.2 billion to more than 50,000 firms. While many of these investments are still maturing, it is estimated that by 1992, SBIR firms had received only $471 million in sales (U.S. Congress, Office of Technology Assessment, 1995, p. 81).

ERIP sales show an almost steady rise from $20 million in 1980 to $77 million in 1989 with the exception of a $5 million decline in 1984. A second sales decline in total sales of about $8 million was experienced in 1990, followed by a very substantial drop of $16 million more in 1991 to $53 million. The most recent three years have seen sales recover to $66 million, $61 million, and most recently, $71 million. Thus, since 1986, when the sales of ERIP technologies reached $62 million, the annual sales of ERIP technologies have fluctuated within a band ranging from $53 million to $77 million. Different mixes of technologies account for these sales each year, but the overall sales attributed to ERIP technologies have been relatively stable for the past nine years.

As is typical of new products and new technologies in general, there is great variation in the levels of sales generated by the ERIP technologies. Cumulative sales of individual inventions range from less than $1,000 to $132 million through the end of 1994. Sixty-nine (or almost half) of the inventions have had cumulative sales of less than $500,000. The average cumulative sales of these 144 ERIP technologies is $5.4 million, which is much larger than the median ($737,000) due to the impact of a small number of highly successful technologies. Over the years, detailed case studies have been conducted of the program's most successful technologies, in order to ensure the validity of their sales and employment data, since they have such a strong influence on the program's performance metrics.

As an indicator of the effectiveness of ERIP, the $961 million (in 1994–$) in cumulative sales generated by ERIP inventions can be compared with program appropriations and grant awards (i.e., "program costs"). Approximately $47.5 million (in 1994–$) were awarded through 1994, and program appropriations totaled about $124 million. Thus, the ERIP program has generated a 20:1 return in terms of the value of sales to grants, and an 8:1 return in terms of sales to total program appropriations.

These ratios have remained remarkably steady since 1986. Only in the early 1980s, when the program was less than a decade old, was the ratio of sales to program costs considerably lower. These results illustrate that there can be a considerable lag time in the ability to observe the overall benefits of commercialization programs. In at least some situations a full decade is required before a program's impacts can be fully appreciated.

[Fig. 1. Program Costs Vs. Sales of ERIP Technologies, in 1994 Dollars]

SALES OF SPINOFF TECHNOLOGIES

This section describes some of the numerous commercial activities that have resulted in part, or in total, from completion of an ERIP project, but that do not involve the ERIP technology as defined in the original invention disclosure to NIST. A majority of these spinoff activities are serendipitous by-products—they were unplanned, unforeseen, and unintended when the ERIP project was initially conceived. Several, on the other hand, were the result of strategic planning that occurred when the inventors were unsuccessful with their original technical approach or their initial primary markets. Nevertheless, they represent tangible benefits that have accrued from the Program.

ERIP's spinoffs have accumulated $98 million (in 1994—$) in sales revenues through 1994. The commercial impact of these spinoff activities has grown substantially over the lifetime of the program. Most of the spinoff technologies identified to date are fairly recent developments, with sales beginning in 1985. It is likely that the role of such ERIP by-products will continue to increase as those entrepreneurs participating in ERIP strive to maximize the market potential of their inventions. One challenge for the Program is to find ways to assist less entrepreneurial ERIP inventors with robust core technologies to exploit their spinoff opportunities.

A challenge for program evaluators is to develop rules of thumb for determining how much, if any, of these successes can be credited to programs such as ERIP. One of the most important issues in evaluating spinoffs from ERIP investments is the nature and strength of the spinoff's linkage to the original ERIP support. Linkage is easiest to establish if the connection between the original technology and its spinoff is highly visible, such as support for core technology developments or specific market applications. These linkages can be readily perceived in terms of modifications in products and processes or in the adoption and use of a technology by a new set of users. Other types of substantive linkages to the original technology development effort may be much less visible, such as critical support for business infrastructure and human capital.

EMPLOYMENT ASSOCIATED WITH ERIP TECHNOLOGIES

The data collected by the 1995 ERIP survey are able to address only the direct effects of the program—employment generated by the development, production, and marketing of ERIP technologies. The diversity of consumer and industrial markets served by ERIP inventions argues against the use of a single multiplier to estimate the indirect and induced effects. Thus,

we are excluding potentially significant employment impacts in our discussion of employment associated with ERIP technologies, including jobs supported by suppliers, subcontractors, and retailers.

The 1995 survey solicited data on the number of direct, full-time equivalent (FTE) employees working on the ERIP technologies in 1993 and 1994. Similar employment data for 1985 through 1992 were collected during previous ERIP evaluations and are presented as job years for comparison purposes (Table 1). (Since ERIP has been collecting employment data for a decade, the term "job years" rather than jobs is used, the former term giving a more accurate picture of the longevity of the program's employment benefits.) These data indicate that there are a significant number of job years sustained over a considerable period of time by the technical development, production, and sales of ERIP technologies.

Table 1. Job Years Supported Directly by Sales of ERIP Inventions

Year	Known FTE's Sustained by Direct Sales	Estimated FTE's Based on Direct Sales	Known FTE's Sustained by Licensed Sales	Estimated FTE's Sustained by Licensed Sales	FTE's Sustained by Inventions Without Sales	Totals
1985	302	14	34	20	126	496
1986	259	27	43	81	100	510
1987	365	14	11	81	129	600
1988	400	17	65	108	147	737
1989	416	31	91	139	120	797
1990	441	37	75	157	132	842
1991	305	23	73	67	140	608
1992	359	39	86	79	104	667
1993	333	76	133	22	68	632
1994	422	104	136	18	77	757

FTE = full-time equivalent employment.

Employment data for 1993 and 1994 are available for most of the inventions with direct sales (since the inventors themselves tended to be interviewed), but they are available for less than half of the inventions being commercialized through license agreements (since not all of the licensees were interviewed). When sales are known, but employment data are unavailable, employment estimates are generated from ratios of ERIP sales to FTEs. For example, in 1994,

the sales-to-FTE ratio for ERIP inventions with known sales and employment, was $90,000. An additional $14.2 million of sales in 1994 is associated with an unknown number of FTE's. Using the $90,000 ratio of sales to jobs, the estimated FTEs supported by $14.2 million of direct sales is 104.

Employment benefits of the program in particular years can by determined readily by dividing the previous year's appropriations (assuming lags in expending funds and cause-and-effect employment results) by the following year's FTEs. In 1984, Federal ERIP appropriations totaled about $4.3 million (in 1984 dollars) thereby sustaining an estimated 496 job years in 1985. The cost in terms of appropriations was about $8700 (in 1994 dollars) spent to support each job year. In 1993, Federal ERIP appropriations amounted to about $6.4 million, which sustained 757 jobs years in 1994. The approximate cost of a job year in 1994 dollars was $8,450. During the 10 year period 1985-1994, ERIP sustained an estimated 6,646 job years at an approximate total funding of $59.5 million or $8,950 per job year (in 1994 dollars).

Over the past decade, the ratio of sales to jobs for inventions sold directly by an inventor's business, has ranged from annual averages of $89,000 to $148,000 (in current year dollars). These values do not deviate markekdly from the U.S. national average for small businesses with some R&D. In 1984 the U.S. General Accounting Office estimated this ratio to be $107,000 (in 1982 dollars). The dollar volume of sales per FTE working on an ERIP project under a licensee is generally higher, ranging from $105,000 to $353,000 over the same ten-year period. However, over the past five years, the ratios of sales to jobs has varied within a fairly small range, from $90,000 to $140,000 for both modes of commercialization.

Based on these results, the estimated number of job years supported by ERIP technologies ranges from a low of 496 in 1985 to a high of 842 in 1990. In every year since 1985, more job years have been sustained by inventions sold directly by inventors than by licensed inventions, despite the fact that licensing has generated greater sales. This is because the ratio of sales to jobs is lower for inventions sold directly than for licensed sales.

The job year estimates presented in Table 1 are not equivalent to the direct employment effects of the Program. To equal the direct effects, one would have to assume that the activity associated with the ERIP project did not displace any pre-existing economic activity; therefore all of the employees working on ERIP projects would have been unemployed if it were not for the ERIP expenditure. In periods of high unemployment (such as 1991 and 1992), it is reasonable to assume that some fraction of these employees would have been without employment, but the exact number is unknown. We conclude that the estimates presented in Table 1 represent upper bounds for the direct effects of the Program; however, they should be considered as underestimates of the total employment effects of ERIP since indirect and

induced effects are not included.

The distribution of jobs per invention is highly skewed. In 1994, for example, seven inventions with known employment each supported more than 40 job years, for a total of 397 job years. Another two inventions with known employment each supported 20 or more job years for a total of 56. Thus, these nine technologies supported 60% of the 757 job years supported by all ERIP projects in 1994. This is similar to the trend documented in previous ERIP evaluations.

TAX REVENUES FROM ERIP-GENERATED EMPLOYMENT

This section employs a simple and conservative approach to estimate two types of tax revenues associated with the Energy-Related Inventions Program. To estimate federal income tax revenues, it uses the number of employees working on ERIP technologies, and weights this employment by the average federal individual income tax to estimate the total federal taxes that can be attributed to the Program. A similar methodology has been used in other program evaluations (Chrisman, Hoy, and Robinson, 1987). To estimate federal corporate income tax revenues, it uses the level of sales, an assumed profit margin, and the effective federal tax rate for corporate profits. A similar methodology was used by Geller and McGaraghan (1996, p. 28).

In 1992, the average federal individual income tax per return was $4,272 (U.S. Department of Commerce, Bureau of the Census, Table No. 537, p. 347, 1995). Based on the statistics presented in the previous section, 757 FTE employees worked on ERIP technologies in 1994. Assuming that each of these employees paid $4,511 (1994-$) in federal individual income taxes, this amounts to a total return of $3.4 million to the U.S. Treasury in 1994.

ERIP technologies are also responsible for some amount of federal corporate tax receipts in 1994, based on the fact that they generated $70.8 million in sales revenues that year. Assuming a gross profit margin of 5% and an effective federal tax rate of 28% on corporate profits (the actual rate as of 1993), ERIP inventions resulted in $1.0 million in federal corporate tax receipts.

Together, these two sources of tax revenues in 1994 totaled an estimated $4.4 million. This total represents 88% of the 1994 ERIP appropriations. Additional tax revenues are associated with royalty payments on ERIP inventions, state and local sales and income taxes, and personal income taxes paid by indirect employment beneficiaries of the program.

EVALUATION CONCLUSIONS

This paper underscores some of the difficult issues that must be addressed to fairly

appraise public investments in technology commercialization programs. Technologies often take 5 to 10 years, or more, to move from the laboratory to the marketplace. As a result, evaluators need to track the progress of program participants for extended periods. To be comprehensive, it is also valuable to consider a technology's technical and marketplace spinoffs, and these may take even longer to emerge. In addition, determining how much of these impacts to attribute to the program can be difficult.

The external and internal validity of program evaluations, whick are critical to the defense of evaluation results, can be difficult and costly to assess. For this reason, they were the subject of special studies conducted only once during the ten years that ERIP has been evaluated. Both of these studies (involving comparison group analysis and an assessment of nonresponse bias) have provided valuable evidence for rebutting critics of the evaluation's findings.

Finally, sales data are the foundation of the ERIP evaluation–they are used to estimate both employment impacts and tax revenues. However, sales have a skewed distribution, such that the total sales summed across all participants are significantly influenced by a small number of highly successful inventions. The accuracy of the sales and employment data from these "big hits" require extra attention in order to be confident of the program's performance metrics.

This evaluation's program metrics, when compared with performance indicators from other technology innovation efforts, suggest that the Energy-Related Inventions Program has been a cost-effective government investment. By the end of 1994, at least 144 ERIP inventions (or 24% of the 609 participating inventions) had entered the market, generating total cumulative sales of $961 million (in 1994–$). With $124 million in program appropriations from 1975 through 1994, ERIP has generated an 8:1 return in terms of sales to program costs.

The commercial progress of spinoff technologies is also significant. Altogether, 52 ERIP spinoffs have generated sales of $98 million (in 1994–$). Most of these involve alternative market applications of technologies that were first successfully introduced into their originally intended markets. But because these spinoffs are indirect program outcomes, they are not included in the estimates of employment benefits and tax revenues.

The employment benefits and tax returns associated with ERIP technologies suggest considerable impacts. At least 757 job-years were directly supported by ERIP technologies in 1994, and 6,646 job-years of employment have been created over the past decade. During this same year, the sales and employment supported by ERIP technologies are associated with tax returns of approximately $3.4 million in federal individual income taxes and $1.0 million in federal corporate tax receipts. Table 2 summarizes these program metrics.

Table 2. Indicators of Program Impacts

Category of Benefit	Indicator of Program Impact
Market Entries	•At least 144 ERIP technologies commercialized, representing a 24% commercialization rate.
Sales	•$961 million (in 1994 dollars) of sales generated by these 144 technologies through 1994.
Spinoffs	•An additional $98 million (in 1994 dollars) in sales generated by 52 spinoff technologies.
Employment	•757 job-years supported directly by ERIP technologies in 1994 and 6,646 supported in 10-year period, 1985-1994.
Taxes	•$4.4 million in ERIP-related tax revenues returned to the U.S. Treasury in 1994.

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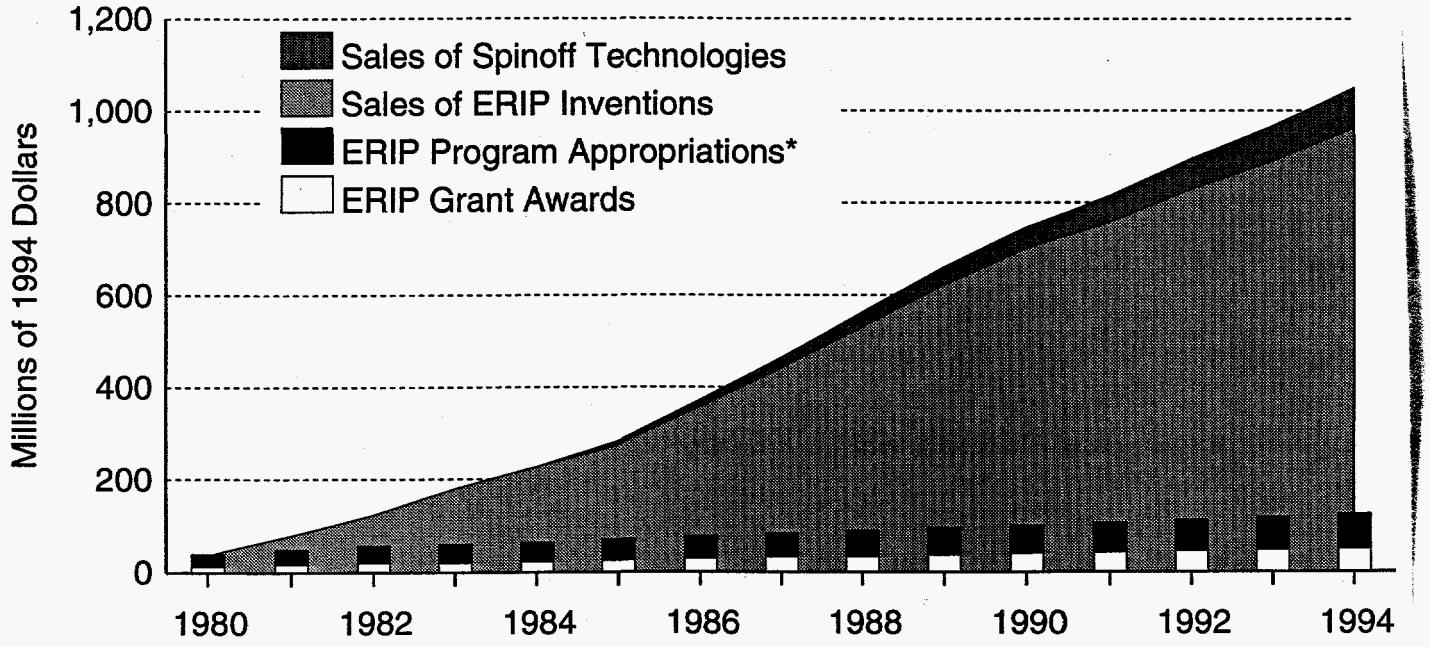

Fig. 1. Program Costs Vs. Sales of ERIP Technologies