

---

**E-Tech:  
Missing the Green**

**Reassessing San Diego's  
Environmental Technology Cluster**

**CBA Promotional Copy**

A product of the  
San Diego Regional Technology Alliance

With Support from  
SourcePoint/SANDAG  
San Diego Workforce Partnership, Inc.  
Center for Applied Competitive Technologies

---

*E-Tech: Missing the Green* is one of a series of reports developed by the San Diego Regional Technology Alliance (RTA) aimed at understanding emerging technology trends in the San Diego region.

This study was developed by Kenn Morris, with assistance from Roberto Campos and Oscar Barba. It is a joint effort of the San Diego Regional Technology Alliance and this report's sponsors: SourcePoint (the non-profit research division of the San Diego Association of Governments/SANDAG), the San Diego Workforce Partnership, and the Center for Applied Competitive Technologies (CACT). RTA thanks these three organizations for their generosity.

#### San Diego Regional Technology Alliance

The San Diego Regional Technology Alliance (RTA) is a private/public partnership that assists San Diego's high-tech industries. The RTA serves as a catalyst for the San Diego educational and business communities for community economic development by:

- Equipping entrepreneurs with the tools to develop their technology businesses,
- Conducting research to educate the region on its technology strength, and
- Creating partnerships between the private and public sector to bridge the "digital divide" and create a skilled workforce for our region's future.

The RTA was established under the California Trade & Commerce Agency by California legislation in 1994 in response to the 1990s defense downsizing and base closures. The RTA, a nonprofit corporation, now focuses on general technology development through entrepreneur services, community outreach, and research. For more information about the RTA and its technology support programs, please visit us at [www.sdrta.org](http://www.sdrta.org), or contact us through the information below:

San Diego Regional Technology Alliance  
1775 Hancock Street, Suite 260, San Diego, CA 92110  
619-615-1050 office Ω 619-615-1058 fax Ω [sdrt@sdrt.org](mailto:sdrt@sdrt.org)  
Clifford Numark, President and CEO

This document was supported by funding from the State of California, through its financial support of the San Diego Regional Technology Alliance. However, any opinions, findings, conclusions or recommendations expressed in this publication are those of the author(s) and do not necessarily reflect the views of the State of California.

*This report has been developed as a part of the San Diego Regional Technology Alliance's research and educational programs, and is intended for informational purposes only. The mention of any company or trade name in this report does not constitute nor is it intended to convey an endorsement by the San Diego Regional Technology Alliance or its underwriters. While all reasonable care has been taken in its preparation, neither the RTA nor its underwriters are responsible for any errors or omissions that may be present.*

*Contents of this report are the property of the San Diego Regional Technology Alliance (2000 ©).*

**E-Tech: Missing the Green  
Reassessing San Diego's  
Environmental Technology Cluster**

**A product of the  
San Diego Regional Technology Alliance**

**With support from  
SourcePoint/SANDAG  
San Diego Workforce Partnership, Inc.  
Center for Applied Competitive Technologies**

## Table of Contents

Executive Summary.....	1
Introduction.....	2
Environmental Technology: Defining the Industry.....	3
Environmental Technology: An Industry Overview.....	4
San Diego’s Environmental Technology Industry.....	5
Relative Wages within San Diego’s Environmental Technology Sectors.....	8
Implications of E-Tech Cluster Employment and Wage Data.....	11
A Case for Redefining the Cluster: SolarFlex Technologies and Science Applications International Corporation (SAIC).....	11
Conclusion.....	12
Appendix 1: Environmental Technology Websites of Interest.....	13
Appendix 2: Map of Environmental Technology Clusters in San Diego Region.....	13
Appendix 3: Top 30 San Diego County Environmental Technology Firms.....	14
Endnotes.....	15

## List of Figures

Figure 1. Environmental Technology Cluster Employment in San Diego County	6
Figure 2. 1998 San Diego County Employment by Industry .....	7
Figure 3. Number of Environmental Technology Establishments in San Diego County (1998).....	8
Figure 4. Average Annual Wages by SIC Code – Environmental Technology Industry in San Diego County (1998).....	9
Figure 5. Average Annual Wages for Environment Technology and other Industries in San Diego County (1998) .....	10
Figure 6. Average Annual Wage Growth Comparison .....	10

---

## Executive Summary

- San Diego's E-Tech – or environmental technology – industry cluster grew only 7.8 percent between 1996 and 1998, employing 4,478 San Diegans. This contrasts with San Diego's employment growth in general, which was 9.4 percent during this same time period.
- The E-Tech industries employing the largest number of employees are the General Industrial Machinery, nec (SIC 3569), and the Process Control Instruments (SIC 3825) industries – together employing more than 52 percent of the industry's workers in the region.
- The two industries with the greatest number of firms also had the greatest growth of new establishments between 1994 and 1998: Process Control Instruments (SIC 3823) and Service Industry Machinery, nec (SIC 3589). The numbers of firms in these two categories nearly doubled during the five year period.
- The E-Tech industry paid \$43,162 in average annual wages in 1998 – almost \$11,000 more than the average for all industries (private and public sectors) in San Diego County. However, wages did not increase during the 1996-1998 time period as fast as they did in the overall labor market in San Diego, indicating potential weaknesses in the industry.
- Problems defining the environmental technology industry have resulted in mismatches between what people generally believe to be occurring in the industry and the statistical information available on the industry. Many seemingly appropriate “environmental technology” activities in the region are not included in the current definition. Including these activities might change the public's perceptions of the strengths or weaknesses of this industry, as well as San Diego public policy makers' efforts to foster the industry.

CBA Promotional Copy

---

**CBA Promotional Copy**

---

## Introduction

The Decade of the Environment. That was what the 200 million people that celebrated the 1990 Earth Day had expected during the last ten years – a focused commitment to and adoption of ecological principles by citizens and businesses. In fact, regional enthusiasm was such that over 50,000 people turned out for the 1990 Earth Day celebration in San Diego’s Balboa Park – the largest such event ever held in the park at that time.

As the decade progressed, less emphasis was given to a “green” restructuring of the economy, however. The promise of “e-business” – at first thought to reflect a renewed emphasis on the “e” in “environment” – was gradually replaced with the “e” in “electronic.” This change occurred despite the public support for environmental issues and products, as well as a wider acceptance by business leaders that a sustainable economy could help both the environment and their revenues.

Although it is clear that San Diego’s economy is benefiting from the “electronic” version of “e-business,” it does not appear that the other “e-industry” – environmental technology – has made deep roots in San Diego County.

This study will explore the environmental technology industry, its general trends nationally and regionally, as well as the prospects for reassessing how the region might encourage its future growth.

### Environmental Technology: Defining the Industry

The first step in understanding San Diego’s environmental technology industry cluster is to define what business activities fall into this category. Unfortunately, there are many definitions of “environmental technology.” As a recent study prepared by the Center for Economic Development at Carnegie Mellon University states:

*“...[M]any companies do not define themselves as ‘environmental’ but as engineering, construction, or biotech. The Environmental Technology cluster can include areas as broad as remediation, filtration, waste treatment, chemicals, sensors, and more.”<sup>1</sup>*

The very broad definition used in the above study led researchers to conclude that environmental technology made up the largest technology cluster in Pennsylvania, with over 176,000 jobs in the state. Such a broad definition likely overstates the role that “technology” plays in the cluster by including many non-technology and non-environmental related economic activities. The definition, in fact, includes *more than 28 separate, four-digit Standard Industrial Classification (SIC) codes.*

---

A more narrow definition adopted by the San Diego Association of Governments (SANDAG) in its 1998 “San Diego Regional Employment Clusters” report states that “...the environmental technology cluster is an emerging cluster of industries that manufacture products with environmental applications.”<sup>2</sup> This more conservative definition covers only seven SIC codes at the four-digit level:

- 3564: Blowers & fans
- 3569: General industrial machinery, nec (“not elsewhere classified”)
- 3589: Service industry machinery, nec
- 3823: Process control instruments
- 3824: Fluid meters & counting devices
- 3826: Analytical instruments
- 3829: Measuring & controlling devices, nec

It is these seven SIC codes that are used in the analysis of the environmental technology industry in the San Diego region – although later in this study we will suggest an expansion of the SANDAG definition.

## Environmental Technology: An Industry Overview

According to the industry’s leading market analysis report, *Environmental Business Journal* (based in San Diego), the U.S. environmental industry (broadly defined) had over 1.3 million employees in 1998, with revenues of nearly \$190 billion. The three largest industry segments (by numbers of employees) were in Solid Waste Management, Consulting & Engineering, and Water Equipment & Chemicals.

Although the industry came from “modest beginnings with 1970 revenues of less than \$20 billion,”<sup>3</sup> it has grown to significant size today. The 10 to 15 percent growth rate for revenues experienced during the late 1980s, however, has declined dramatically. 1996 revenue growth for the environmental industry was only 1.2 percent, increasing slightly in recent years, with 1998 revenue growth of just over 2 percent.<sup>4</sup> As noted by the *Environmental Business Journal*:

*“...the environmental industry looks back on a rather disappointing decade. Based on the double-digit annual growth of the ’80s, a seemingly infinite supply of environmental problems and a wealth of popular support, the ’90s once looked promising. As it turned out, we can fairly term the ’90s as ‘the lost decade.’ ”<sup>5</sup>*

Some of the causes of this decline: the recession of the 1990s (underscoring the fragility of the industry during weak economic times), a reliance upon regulations to drive the industry’s growth, and – fundamentally – a decrease in public opinion that stronger environmental laws and regulations are needed. Since 1992, in fact, the percentage of Americans that believe environmental laws and regulations have “not gone far enough” has decreased from 63 percent to 47 percent.<sup>6</sup> The percentage of the public that believes that environmental protection has either struck the right balance or has gone too far increased from 27 percent to 45 percent – significantly weakening the public demand for environmental spending.

What are the implications for the environmental technology industry? First, that it will require a reinvention of its business model to become based not so much on

---

regulatory demand as providing inherent value to its customers. “[The environmental industry] needs to sell productivity *plus* compliance, business solutions, *and* environmental solutions.”<sup>7</sup> Other strategies identified by a study developed by the U.S. Department of Commerce include:

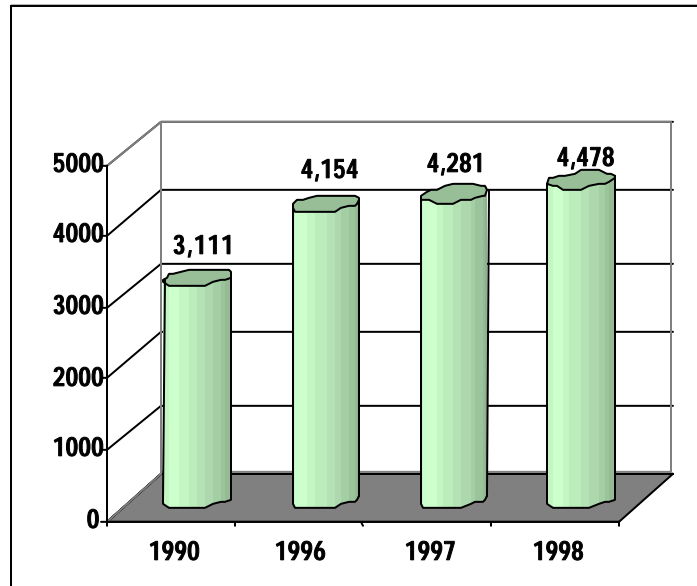
- Remaining competitive by leading the transition from a regulatory-based market to one that encompasses the core business objectives of the customers.
- Focusing on long-term solutions for the market, not just one-time sales of products or services.
- Identifying niches in the market that are prone to outsourcing by potential clients and customers.
- Utilizing technology-based systems to differentiate the environmental services offered.
- Developing a flexible market position not just based on domestic U.S. sales, but on global sales, as well.<sup>8</sup>

Perhaps ironically, these precepts are requirements *not just for environmental technology firms, but also for electronic commerce and other technology firms.*

### San Diego’s Environmental Technology Industry

Utilizing the definition of the environmental technology cluster as developed by SANDAG (consisting of SIC codes 3564, 3569, 3589, 3823, 3824, 3826, and 3829), an analysis of San Diego County employment trends was undertaken. Since the 1998 SANDAG study that first described the cluster, it is significant to note that regional employment has only increased from 4,154 employees in 1996, to 4,478 employees in 1998 – a 7.8 percent increase over the two years (see Figure 1). This contrasts with an increase in overall San Diego employment of 9.4 percent during the same time period – notably higher.

Figure 1. Environmental Technology Cluster Employment in San Diego County

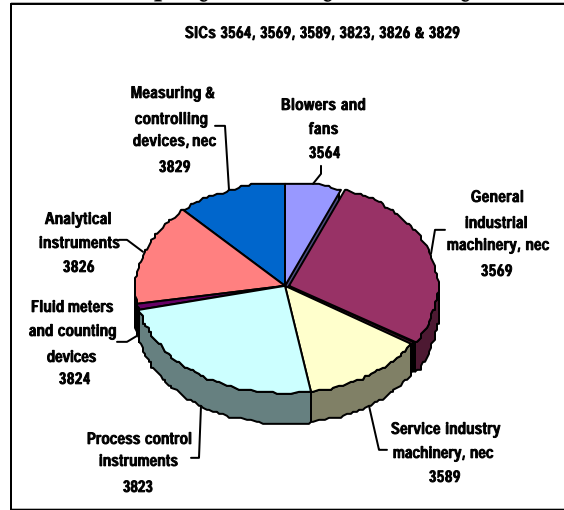


The steady but relatively slow employment growth of San Diego's environmental technology cluster mirrors the overall slowdown in revenues that the environmental industry is experiencing at a national level. At the same time, many of the region's environmental technology firms are linked to biotechnology laboratories, the health care industry, and the electronics industry in their focus on water purification and treatment technologies – including firms like Hydranautics, Osmonics Desal, US Filter, and Nimbus Water Systems, among others.<sup>9</sup> As such, the prospects for these other technology industries should be a positive factor for the future growth of San Diego's environmental technology firms.

In addition to firms involved with water and water treatment, several other sectors are prominent in San Diego, as seen in Figure 2. In terms of employment by sector, San Diego's industry cluster is structured as follows:

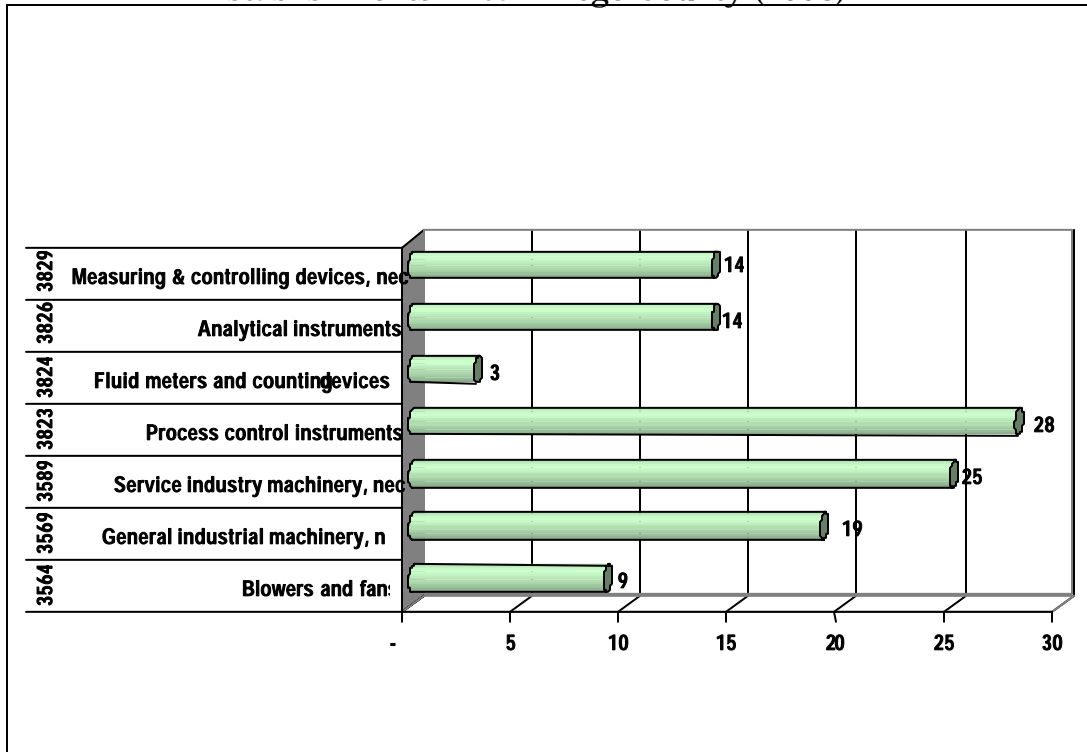
- General industrial machinery, nec (“not elsewhere classified”): 28 percent
- Process control instruments: 24 percent
- Analytical instruments: 16 percent
- Service industry machinery, nec: 13 percent
- Measuring & controlling devices: 12 percent
- Blowers & fans: 6 percent
- Fluid meters & counting devices: 1 percent

Figure 2. 1998 San Diego County  
Employment by Industry



In terms of numbers of firms, Process Control Instruments and Service Industry Machinery predominate, with 28 and 25 establishments (respectively) in 1998 (see Figure 3). It is interesting to note that firms in the Process Control Instruments (SIC 3823) and Measuring & Controlling Devices (SIC 3829) industries seem to be the most mature of the seven sectors analyzed. While all of the other five industry sectors are comprised almost entirely of firms with fewer than 50 employees, these two more mature industries include a diversity of mid-sized (i.e., 20 to 99 employees) and larger sized (100+ employees) firms.<sup>10</sup> As such, they are likely the most established firms within San Diego's environmental technology industry cluster.

Figure 3. Number of Environmental Technology Establishments in San Diego County (1998)

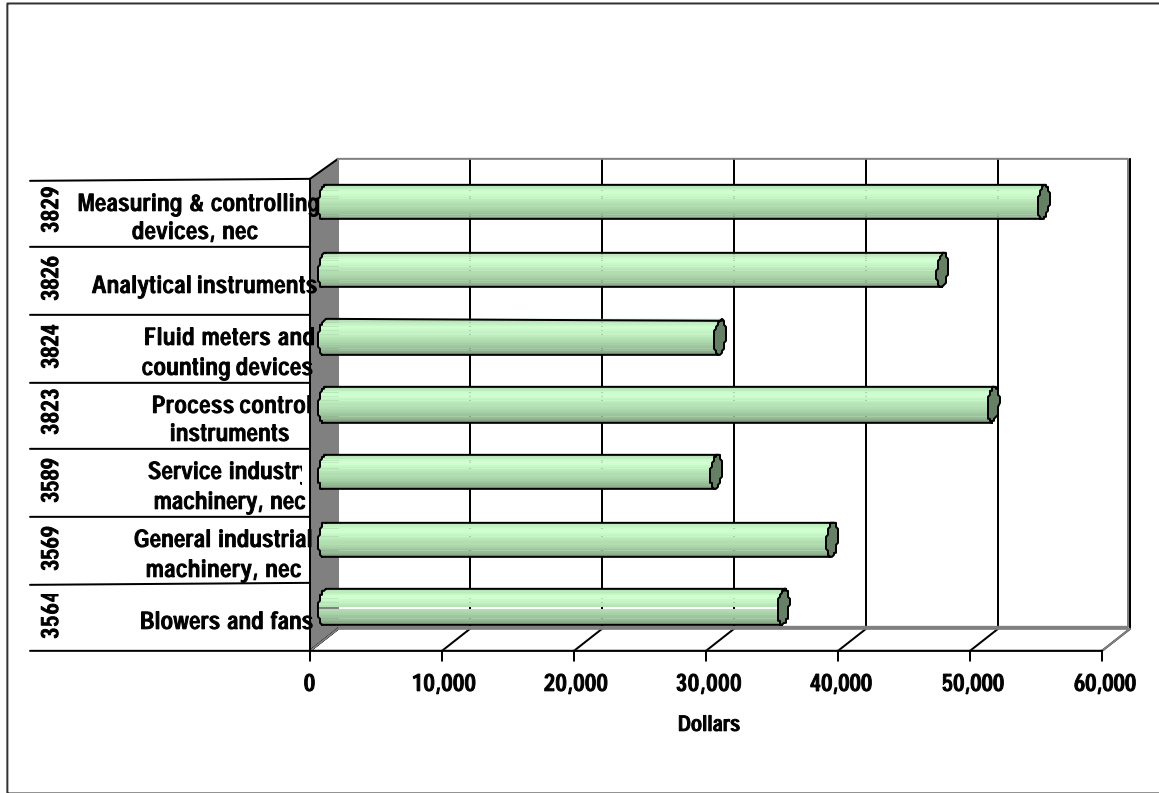


Comparing the number of establishments in 1998 with those in 1994, it is instructive to note that the two largest sectors (in terms of number of establishments) are also the two with the greatest increase in the number of firms. The number of Process Control Instrument establishments blossomed from 16 in early 1994, to 28 by 1998. Likewise, the number of Service Industry Machinery establishments almost doubled from 13 in 1994 to 25 by 1998. Companies in these two sectors are primarily involved with water filtration, water purification, industrial water treatment, water quality monitoring and flow equipment, gas and liquid flow equipment, pressure and liquid control equipment, and other related industrial and commercial machinery.

### Relative Wages within San Diego’s Environmental Technology Sectors<sup>11</sup>

The progress of San Diego’s environmental technology cluster so far is a mixed picture, contrasting weak employment growth overall with the fast growth of establishments in specific sectors of the industry. Adding to this mixed picture is the average annual wages earned within the regional industry in 1998. As seen in Figure 4, wages paid within the industry in general tend to be among the highest in San Diego County – \$43,162 on average. Average annual wages range from \$29,701 to over \$54,000, depending on the sector. The average annual wage in San Diego County, in comparison, was only \$32,221 in 1998.<sup>12</sup>

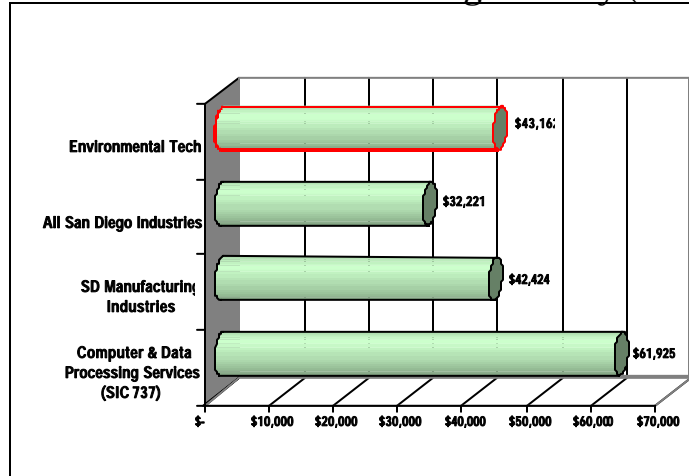
Figure 4. Average Annual Wages by SIC Code - Environmental Technology Industry in San Diego County (1998)



Several observations, however, must be made about the wages in the environmental technology industry. First, although the average annual wage appears favorable, it is not much different from the average annual wage for manufacturing in general in San Diego County: \$42,424. In fact - as seen in Figure 5 - wages in several other sectors, such as Computer & Data Processing Services (SIC 737), were much higher than the average wage for environmental technology firms, paying almost \$62,000 on average.

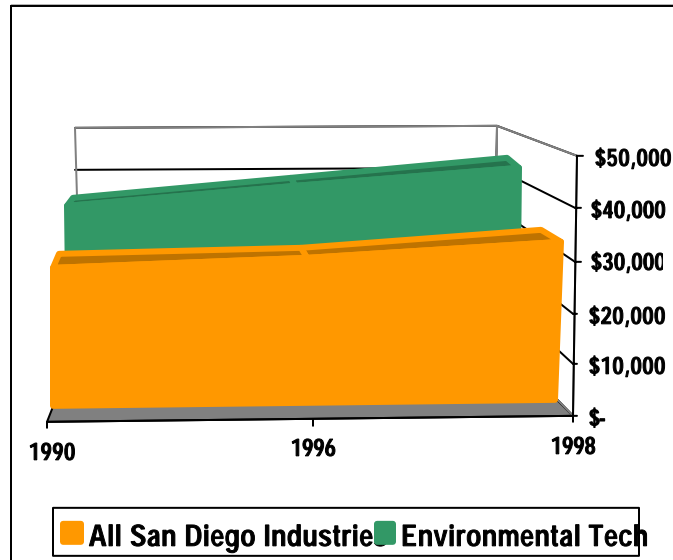
CBA Promotional Copy

Figure 5. Average Annual Wages for Environment Technology and other Industries in San Diego County (1998)



Also important to note is the fact that the average annual wage between 1996 and 1998 increased at a slightly faster rate for San Diego businesses in general – 11.9 percent – than for the environmental technology cluster. The cluster saw wages increase only 11.3 percent during the same time period (see Figure 6).

Figure 6. Average Annual Wage Growth Comparison



CBA Promotional Copy

---

## Implications of E-Tech Cluster Employment and Wage Data

Given the general slowdown of the environmental industry throughout the United States – a slowdown that is also reflected in San Diego’s E-Tech industrial cluster – what are some of the implications of the previous employment and wage data?

- First, San Diego’s environmental technology industry makes up a relatively small part of the overall regional economy – *less than one-half percent of all regional employees are in this cluster.*
- Second, San Diego’s environmental technology industry – as currently defined – has become relatively weak in comparison to other technology sectors, both in terms of growth and in wages. As such, given limited resources, it may be difficult to justify policy efforts aimed at this industry cluster (as opposed to other technology sectors or general manufacturing activities).
- Third, given that various agencies (such as the California Trade & Commerce Agency and the State of Pennsylvania) and private-sector groups define the industry in a broader way, it might be that this and other analyses of the cluster are missing the real impact of these companies on our region. This would call for a possible redefinition of the cluster. Alternatively, an informal phone survey of companies currently listed as part of the environmental technology cluster only underscores the complexity in trying to use SIC codes to define industry clusters: of twelve environmental technology firms contacted regarding this study, five did not feel that they fit into the category of “environmental technology.”

A Case for Redefining the Cluster: SolarFlex Technologies and Science Applications International Corporation (SAIC)

Although there are some good reasons for retaining the existing, more -narrow SANDAG definition of the E-Tech industry in San Diego, the definition may not accurately capture all of the environmentally related technological activities that occur throughout our region. If this is true, San Diego’s public policy makers may not institute the investment and incentives to allow such emerging innovations to grow. In fact, the existing definition may ignore some “climate-friendly” technologies (i.e., technologies that reduce or avoid greenhouse gas emissions) that will be “essential if the United States and the rest of the world are to reduce greenhouse gas emissions cost effectively.”<sup>13</sup>

Two local companies that are not currently included in the defined environmental technology cluster are SolarFlex Technologies and Science Applications International Corporation (SAIC):

### SolarFlex Technologies

One of San Diego’s emerging, environmentally-oriented technology firms, SolarFlex is a two-year old company working to develop a proprietary, flexible, thin-film solar cell. According to company representatives, their solar technology will allow solar energy to be generated at a cost competitive with some existing traditional fossil fuel sources – 9¢ per kilowatt-hour, versus the usual 21¢ kw/hr for other solar technologies and

---

13.5¢ kw/hr for fossil fuel-based sources. The company, based in Mira Mesa, is currently limited to only a few employees. However, the company is seeking financing for development of a production line for their solar cells. See [www.solarflextechnologies.com](http://www.solarflextechnologies.com) for more information.

#### Science Applications International Corporation

One of San Diego's largest employers, SAIC is often thought of as a defense-related or systems integrator firm. Less well known is their involvement in many areas of the environmental technology industry, including ISO-14000 environmental management systems, National Environmental Protection Act (NEPA) consulting, geographic information systems applications, software developed for the *Green Exchange*, storm water management, and their energy projects division. Indeed, the *Environmental Business Journal* places SAIC as one of the largest environmental companies in the United States. Yet, SAIC is classified in the SIC code for "Search, Detection, Navigation, Guidance, Aeronautical & Nautical Systems and Instruments" (SIC code 3812). See [www.saic.com](http://www.saic.com) for more information.

These two firms reflect a spectrum of environmental technology firms in San Diego that are not currently covered by the existing industry cluster definition. Although no definition will ever be perfect, it is clear that some form of redefinition should take place, possibly in conjunction with the increasing use of the North American Industrial Classification System (NAICS).

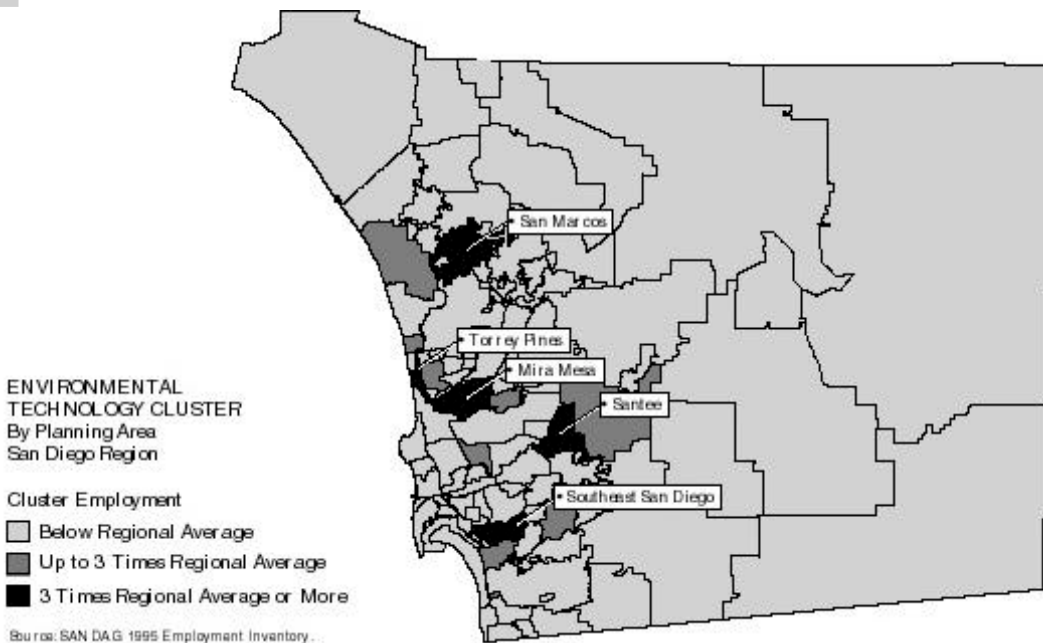
### Conclusion

San Diego's E-Tech industry cluster is small, but could potentially have a much greater impact on the region than we currently understand. It is important – for both economic development and for real ecological reasons – that further investigation be taken to redefine and possibly enlarge the businesses covered under this cluster definition. In part, this is a reflection of potentially having misclassified some firms into the cluster, as well as perhaps having left some important firms out. With a better understanding of both the types of technologies that are being developed within the environmental technology industry, and a better understanding of their importance to bettering our world, San Diego can develop a stronger focus on job development that benefits our quality of life and our environment.

## Appendix 1: Environmental Technology Websites of Interest

Company/Organization	Website Address
Hemispheric Center for Environmental Technology	<a href="http://www.hcet.fiu.edu">www.hcet.fiu.edu</a>
National Renewable Energy Laboratory	<a href="http://www.nrel.gov">www.nrel.gov</a>
Pacific Northwest National Laboratory	<a href="http://www.pnl.gov">www.pnl.gov</a>
Sustainable Business Network	<a href="http://sbn.netforchange.com">sbn.netforchange.com</a>
Sustainable Business.com	<a href="http://www.sustainablebusiness.com">www.sustainablebusiness.com</a>
The Global Network of Environment & Technology	<a href="http://www.gnet.org">www.gnet.org</a>
United States-Asia Environmental Partnership	<a href="http://www.usaep.org">www.usaep.org</a>
U.S. Department of Energy – Energy Efficiency & Renewable Energy Network	<a href="http://www.sustainable.doe.gov">www.sustainable.doe.gov</a>
USAID's Global Technology Network	<a href="http://www.usgtn.org">www.usgtn.org</a>
Weststart-Calstart	<a href="http://www.calstart.org">www.calstart.org</a>

## Appendix 2: Map of Environmental Technology Clusters in San Diego Region



**Appendix 3: Top 30 San Diego County  
Environmental Technology Firms  
(SIC Codes 3564, 3569, 3589, 3823, 3824, 3826 and 3829)**

<b>Employer</b>	<b>City</b>	<b>ZIP</b>	<b>SIC</b>	<b>Size</b>
1. Ferran Scientific, Inc.	San Diego	92121	3826	250-499
2. Asymtek, Inc.	Carlsbad	92008	3823	100-249
3. Hydronautics	Oceanside	92054	3589	100-249
4. Aquanetics Systems, Inc.	San Diego	92110	3589	100-249
5. AP Labs, Inc.	San Diego	92121	3823	100-249
6. Metrika Systems Corporation	San Diego	92121	3829	100-249
7. SKF Condition Monitoring, Inc.	San Diego	92123	3829	100-249
8. Phase Metrics	San Diego	92121	3829	100-249
9. Action Instruments Company, Inc.	San Diego	92123	3823	100-249
10. Koch Fluid Systems	San Diego	92131	3589	100-249
11. Hardy Instruments, Inc.	San Diego	92123	3823	100-249
12. Fluid Components International	San Marcos	92069	3824	100-249
13. Polaris Pool Systems, Inc.	San Marcos	92069	3589	100-249
14. Osmonics/Desal	Vista	92083	3589	100-249
15. Standard Filter Corporation	Carlsbad	92008	3569	50-99
16. Myron L. Company	Carlsbad	92009	3829	50-99
17. Glacier Water Services, Inc.	Carlsbad	92009	3589	50-99
18. CP Manufacturing, Inc.	National City	91950	3569	50-99
19. Fire Protection Systems Company	San Diego	92123	3569	50-99
20. Washington Inventory Service	San Marcos	92069	3589	50-99
21. GIA GEM Instruments	Carlsbad	92008	3829	20-49
22. Romer, Inc.	Carlsbad	92008	3823	20-49
23. Innovative Medical Services	El Cajon	92020	3589	20-49
24. US Filter Corporation	El Cajon	92020	3589	20-49
25. Maxim Pharmaceuticals	San Diego	92122	3826	20-49
26. Stires Precision Recording, Inc.	San Diego	92121	3823	20-49
27. Bioserv Corporation	San Diego	92121	3829	20-49
28. Automation Technologies	San Diego	92121	3569	20-49
29. US Water Products, Inc.	San Diego	92121	3589	20-49
30. Reotemp Instrument Corporation	San Diego	92121	3823	20-49

Sources: San Diego Association of Governments ([www.sandag.org](http://www.sandag.org)), San Diego Workforce Partnership ([www.workforce.org](http://www.workforce.org)) & ERISS ([www.eriss.com](http://www.eriss.com)). Data reflects 1999 employment information as available.

---

## Endnotes

<sup>1</sup> "Opportunities for Growing the Environmental Technology Cluster in Pennsylvania," The Center for Economic Development, Carnegie Mellon University (February, 1999), p. 3.

<sup>2</sup> "San Diego Regional Employment Clusters," SANDAG/SourcePoint (May-June, 1998), p. 20.

<sup>3</sup> "Meeting the Challenge: U.S. Industry Faces the 21<sup>st</sup> Century - the U.S. Environmental Industry," Office of Technology Policy, the U.S. Department of Commerce (October, 1998), p. 22.

<sup>4</sup> "Environmental Industry Evolution Sets Up the Next Industrial Revolution," *Environmental Business Journal* (Vol. XII No. 5/6, 1999).

<sup>5</sup> "Environmental Industry Evolution..." *EBJ*

<sup>6</sup> *National Environmental Education & Training Foundation/Roper Report Card* (1999), p. 42.

<sup>7</sup> "Meeting the Challenge..." p. 110.

<sup>8</sup> "Meeting the Challenge..." p. 112-113.

<sup>9</sup> Dr. Rebecca Morales, "Environmental Technology Notes" (December, 1999).

<sup>10</sup> Size of firm from U.S. Census Bureau, County Business Pattern data for 1997.

<sup>11</sup> Data compiled from the Bureau of Labor Statistic.

<sup>12</sup> Average wages for all industries (including private & public sector) in San Diego County (ES-202 data).

<sup>13</sup> "Towards a Sustainable America," The President's Council on Sustainable Development (May, 1999), p. 2-19.

**CBA Promotional Copy**

September 2000

---

CBA Promotional Copy

San Diego Regional Technology Alliance (RTA) is dedicated to providing assistance to San Diego's technology community through direct business assistance, public and private partnerships to bridge the digital divide, and research and education to promote sustainable tech-based economic growth.



---