JOBS CREATION IN THE ENVIRONMENTAL INDUSTRY IN FLORIDA AND THE UNITED STATES

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This report is a project of the Jobs and Environment Initiative, a pilot program of research, policy analysis and public education. The Florida report is part of a series of state-based and national reports on current jobs creation in the environmental industry, including in manufacturing, and further jobs potential inherent in environmental management and stewardship. Other reports completed examine jobs creation and the environmental industry in Michigan, Minnesota, Ohio, and Wisconsin and are available on the above websites.

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TABLE OF CONTENTS

LIST OF TABLES iv

LIST OF FIGURES iv

EXECUTIVE SUMMARY v

I. INTRODUCTION 1

II. BACKGROUND: THE U.S. ENVIRONMENTAL PROTECTION INDUSTRY AND RELATED JOBS 3

II.A. Emergence of the Environmental Protection Industry 3
II.B. Environmental Protection as a Recession Proof Industry 5
II.C. The Current Size and Structure of the Industry 6
II.D. Prospects for the Future 7

III. DEFINING AND ESTIMATING ENVIRONMENTAL JOBS 10

III.A. What Constitutes an Environmental Job? 10
III.B. The Types of Jobs Created in the Environmental Industry 12
III.C. The Jobs Distribution in Typical Environmental Companies 15

IV. THE FLORIDA ECONOMY IN 2003 19

V. THE ENVIRONMENTAL INDUSTRY AND JOBS IN FLORIDA 23

V.A. Summary of the Environmental Industry and Jobs in Florida 23
V.B. Environmental Jobs in Florida by Industrial Sector 23
V.C. Environmental Jobs in Florida by Occupation and Skill 26
V.D. The Environmental Industry as an Economic Driver for Florida 31

TABLE OF CONTENTS
(Continued)

VI. SUMMARY PROFILES OF SELECTED FLORIDA ENVIRONMENTAL COMPANIES 33

VI.A. American Compliance Technologies, Inc. 33
VI.B. Ayres Associates 36
VI.C. Blasland, Bouck, and Lee, Inc. 37
VI.D. Biological Research Associates, Inc. 38
VI.E. Environmental Consulting and Technology, Inc. 40
VI.F. GeoSyntec Consultants 42
VI.G. Glatting Jackson 43
VI.H. Lang Engineering and Environmental Services 44
VI.I. Malcolm Pirnie 45
VI.J. Marinco Bioassay Laboratory 47
VI.K. OHC Environmental Engineering 47
VI.L. Servern Trent Laboratories 49
VI.M. WRS Infrastructure and Environment, Inc. 49

VII. OPPORTUNITIES IN FLORIDA STATE GOVERNMENT PROGRAMS FOR ENCOURAGING ENVIRONMENT-RELATED JOBS 52

VII.A. Governor's Council of Economic Advisors 52
VII.B. Florida Department of Environmental Protection 52
VII.C. Office of Strategic Projects and Planning 53
VII.D. Florida Energy Office 54
VII.D.1. Front Porch Florida/Front Porch Sunshine 54
VII.D.2. SunSmart Schools Program 54
VII.E. Strategic Plan for Economic Development 55
VII.F. Florida Hydrogen Initiatives and Incentives 58
VII.F.1. The Florida Hydrogen Initiative, Inc. 58
VII.F.2. The Hydrogen Business Partnership 58
VII.F.3. The Florida Hydrogen Business Council 58
VII.F.4. The Hydrogen and Fuel Cells Summit 59
VII.F.5. Hydrogen Demonstration Programs 59
VII.F.6. State Hydrogen Industry Incentives 59
VII.G. Florida High Tech Corridor Council 60
VII.H. Florida Research Consortium 61
VII.I. Enterprise Florida 62
VII.J. TREEO Annual Statewide Pollution Prevention Conference 63
VII.K. Florida Technology Development Act 64
VII.L. The Comprehensive Everglades Restoration Plan 64

TABLE OF CONTENTS
(Continued)

VIII. SUMMARY OF MAJOR FINDINGS 68

BIBLIOGRAPHY 73

APPENDIX: U.S. COMMERCE DEPARTMENT ESTIMATES OF THE ENVIRONMENTAL INDUSTRY IN FLORIDA 82

ABOUT THE JOBS AND ENVIRONMENT INITIATIVE 87

ABOUT MANAGEMENT INFORMATION SERVICES, INC. 87

ABOUT THE BUILDING DIAGNOSTICS RESEARCH INSTITUTE, INC. 87

BIOGRAPHICAL INFORMATION 88

LIST OF TABLES

1. Environmental Protection Expenditures and Jobs in the U.S. Economy, 1970 - 2020 3

2. Typical Employee Profile of a 100-person Environmental Remediation Services Company, 2003 17

3. Typical Employee Profile of a 250-person Wind Turbine Manufacturing Company, 2003 18

4. Earnings by Industry of Employment in Florida and the U.S. in 2003 22

5. Jobs in Florida in 2003, by Industry, Including Environmental Employment 24

6. Environmental Jobs Generated in Florida in 2003, by Selected Occupations 27

7. Summary of the Select Florida Environmental Companies Profiled 34

A.1. U.S. Department of Commerce Estimates of the U.S. and Florida Environmental Industries, 1999 78

A.2. U.S. Department of Commerce Estimates of the Florida Environmental Industry by Metropolitan Statistical Areas, 1999 79

A.3. Pollution Abatement Costs and Expenditures Estimates for Florida and the U.S. From the Census MA200 Survey, 1999 80

LIST OF FIGURES

1. The Environmental Job Spectrum 13

2. Selected U.S. Jobs Created in 2003 by Environmental Expenditures 14

EXECUTIVE SUMMARY

Objective of the Report

The objective of this report is to examine and describe the environmental industry and its jobs impact and jobs creation potential in the state of Florida, and to provide national context on the U.S. environmental industry as a whole.

The relationship between jobs and the environment is important to examine, in view of the size of the environmental industry and because the jobs impact of environmental management has been at times controversial. The report aims to examine the "trade-off" between jobs and environmental protection and highlight specific examples of how the environmental industry in Florida and nationally has had, and could have, jobs benefits. Therefore, this report:

- Assesses the current size of the environmental industry and related jobs in the U.S. and the prospects for the future
- Analyzes the concept and definition of an "environmental job"
- Estimates the size and the industrial sector composition of the environmental industry in Florida in 2003
- Estimates the jobs created in Florida in 2003 by environmental protection and their importance to the state economy
- Estimates the occupation and skill levels of these jobs
- Identifies a sample of typical environmental companies in Florida, the products and services they provide, their geographic location, and the number of jobs they create
- Identifies state government initiatives and policies that could facilitate further development of environmental industries in Florida
- Discusses how encouraging environmental and related industries in Florida could form an integral part of state economic development strategy
- Presents findings and conclusions

Findings -- The National Context

MISI has extensive experience analyzing the environmental industry. We have found that, over the past four decades, protection of the environment has grown rapidly to become a major sales-generating, profit-making, job-creating U.S. industry. Yet, we have also found that the importance of the environmental industry to the U.S. economy is still not fully understood by policy makers or the public at large.

MISI estimates that in 2003 protecting the environment generated $301 billion in total industry sales, $20 billion in corporate profits, 4.97 million jobs, and $45 billion in Federal, state, and local government tax revenues. Moreover, the industry transcends traditional understanding of "green jobs," often wrongly assumed to be jobs for people to plan trees or clean up toxic waste sites or pollution accidents. (All estimates of the size of the environmental industry and jobs impact rely upon definitions used. MISI estimates rely upon the definitions in Chapter III).

The environmental industry will continue to grow for the foreseeable future. MISI forecasts that in the U.S. real expenditures (2003 dollars) will increase from $301 billion in 2003 to $357 billion in 2010, $398 billion in 2015, and $442 billion in 2020; environmental employment will increase from 4.97 million jobs in 2003 to 5.39 million jobs in 2010, 5.76 million jobs in 2015, and 6.38 million jobs in 2020.

Environmental protection created nearly five million jobs in the U.S. in 2003, and these were distributed widely throughout all states and regions in the U.S. The vast majority of the jobs created by environmental protection are standard jobs for accountants, engineers, computer analysts, clerks, factory workers, truck drivers, mechanics, etc., and most of the persons employed in these jobs may not even realize that they owe their livelihood to protecting the environment.

Environmental protection is a large and growing industry in Florida, and MISI estimates that in 2003:

- Sales generated by the environmental industries in Florida totaled $15.4 billion.
- The number of environment-related jobs totaled 220,000.
- The environmental industry in Florida comprised three percent of gross state product.
- Florida environmental industries accounted for five percent of the sales of the U.S. environmental industry.

- With 5.7 percent of the nation's population, employment earnings in the Florida manufacturing sector account for 2.3 percent of manufacturing earnings nationally.

- Environment-related jobs comprised three percent of Florida employment.

- Environment-related jobs in Florida comprised 4.4 percent of the total number of environment-related jobs in the U.S.

- Environment-related employment in the state has been increasing in recent years between one and two percent annually.

Most of the environmental jobs in Florida are in the private sector, and these are heavily concentrated in several sectors, including manufacturing, professional, scientific, and technical services, and educational services.

Types of Environmental Jobs in Florida

Environmental jobs in Florida are widely distributed through all occupations and skill levels, and requirements for virtually all occupations are generated by environmental expenditures. Thus, in Florida as in the U.S. generally, the vast majority of the jobs created by environmental protection are standard jobs for all occupations.

Nevertheless, we found that, in Florida, the importance of environmental expenditures for jobs in some occupations is greater than for others. For some occupations, such as environmental scientists and specialists, environmental engineers, hazardous materials workers, water and liquid waste treatment plant operators, environmental science protection technicians, refuse and recyclable material collectors, and environmental engineering technicians, virtually all of the demand in Florida is created by environmental protection activities.

However, in occupations not traditionally identified as environment-related, a significant share of the jobs is also generated by environmental protection. While, on average, environment-related employment in Florida comprises only three percent of total employment, in 2003 environmental protection generated jobs for a larger than average share of many professional, scientific, high-tech, and skilled workers in the state.

An important finding derived here is the significance of the environmental industry in Florida compared to other sectors of the economy. For example, the tourism industry generates about 540,000 jobs in the state, and Florida well recognizes the key role that tourism plays in the state economy. Here we estimate that environment-related jobs in Florida total 220,000 – jobs that tend to be more highly skilled and better paying than those in the tourism sector. This fact is not widely known or appreciated by policy-makers in the state.

Our survey of existing environmental companies in Florida revealed a wide range of firms, and they are located throughout the state, in major urban centers, suburbs, small towns, and rural areas; they range in size from small firms of 12 employees to large firms employing thousands; they are engaged in a wide variety of activities, including remediation, engineering, testing, monitoring, analysis, etc.; and they include some of the most sophisticated, high-tech firms in the state. A number of these firms have created significant numbers of new jobs over the past six months, at a time when Florida has been concerned about jobs, especially for highly skilled, well-paid, technical and professional workers

Salience of the Jobs-Environment Link in Florida at the Policy Level

We identified a number of existing state initiatives and interventions that could be used to assist the environmental industry and create jobs.

Key Points

First, contrary to common perception, most of the jobs created by environmental protection – both nationwide and in Florida -- are ***not*** for "environmental specialists." The vast majority of the jobs created by environmental protection are standard jobs for a wide variety of occupations.

Second, as noted above, environmental jobs in Florida are concentrated within a number of sectors, including manufacturing and professional, scientific, and technical services. This is significant because Florida is seeking to modernize and expand its high-tech industrial and manufacturing base. Environmental protection offers a means of doing this, and investments in the environment can aid in this objective.

Third, since the late 1960s, protection of the environment has grown rapidly to become a major U.S. industry. Protection of the environment and remediation of environmental problems will continue to be a growing and profitable industry in the U.S., and astute business and labor leaders, government officials, and policymakers in Florida – and in other states – should be cognizant of this.

Fourth, all regions and states benefit substantially from environmental expenditures. Many of the economic and employment benefits flow directly to states – such as Florida -- whose policymakers and government officials often see only costs and disadvantages from environmental protection. Yet, these policymakers and the public should welcome information that environmental protection offers substantial opportunities for economic development and job creation.

Fifth, investments in environmental protection will create large numbers of jobs for highly skilled, well-paid, technical workers, including college-educated professionals, many with advanced degrees, requiring advanced training and technical expertise, many of them in the manufacturing sector.

These are the kinds of jobs that states seek to attract and which provide the foundation for entrepreneurship and economic growth. These types of jobs are also a prerequisite for a prosperous, middle class society able to support state and local governments with tax revenues,

Sixth, perhaps most important, this study demonstrates that environmental protection can form an important part of a strategy for Florida based on attracting and retaining professional, scientific, technical, high-skilled, well paying jobs, including manufacturing jobs. There is no inherent institutional impediment in Florida to using existing state economic assistance policies and incentives to facilitate and encourage development of the environmental industry in the state, especially given that industry's strong pre-existing economic traction.

Contents of the Report

- Chapter II -- History and current status of the U.S. environmental industry; provides industry and job forecasts through 2020

- Chapter III -- Definition of environmental jobs; illustrates the typical composition of occupational employment within environmental companies

- Chapter IV -- The current state of the Florida economy and labor market

- Chapter V -- Size, employment, and industrial and occupational composition of the environmental industry in Florida

- Chapter VI – Profiles of typical environmental firms in the state

- Chapter VII -- Florida Policy Context, Opportunities and Gaps; identifies state programs that could be used to assist environmental firms

- Chapter VIII – Summary of major findings

I. INTRODUCTION

The nexus between jobs and the environment will increase in importance in the future as the U.S. and other nations strive to meet pressing need for employment and income generation, while also confronting the challenges of multi-source pollution, energy waste and inefficiency, traffic congestion, climate change, scarcity of potable and usable water, electric grid reliability, etc. The prevailing view among economic development proponents has been that environmental protection is negative for jobs and employment. However, this view is not supported by empirical evidence. In addition, it is possible to estimate and document the overlooked size of the environmental industry in the U.S. as a whole, and at the state level, and the jobs this industry has protected and created.

The challenge -- and opportunity -- is to begin to shift the debate from "trade-offs" between jobs and environmental protection to a new level of congruent and integrated environmental and economic policy. This report provides information on jobs creation among individual environmentally-related companies as recently as May 2004, and we also note the results of prior research on the environmental industry over time.

Here we:

- Assess the current size of the environmental industry and related jobs in the U.S. and the prospects for the future
- Analyze the concept of an "environmental job"
- Estimate the size and the industrial sector composition of the environmental industry in Florida in 2003
- Estimate the jobs created in Florida in 2003 by environmental protection and their importance to the state economy
- Estimate the occupation and skill levels of these jobs
- Identify a sample of environmental companies in Florida, the products and services they provide, their geographic location, and the number of jobs created
- Identify state government programs that could be used to facilitate development of environmental industries in Florida

- Discuss how encouraging environment and related industries in Florida could form an integral part of state economic development strategy

- Summarize the major research findings

II. BACKGROUND: THE U.S. ENVIRONMENTAL PROTECTION INDUSTRY AND RELATED JOBS

II.A. Emergence of the Environmental Protection Industry

Contrary to general public perception and public policy understanding, since the late 1960s, protection of the environment has grown rapidly to become a major sales-generating, profit-making, job-creating industry. Expenditures in the U.S. for environmental protection (EP) have grown (in constant 2003 dollars) from $39 billion per year in 1970 to $301 billion per year by 2003 -- increasing more rapidly than GDP over the same period. As shown in Table 1:

- In 1970, environmental protection expenditures totaled $39 billion (2003 dollars).
- In 1980, environmental protection expenditures totaled $121 billion (2003 dollars).
- In 1990, environmental protection expenditures totaled $204 billion (2003 dollars).
- In 2003, environmental protection expenditures totaled $301 billion (2003 dollars).

Table 1
Environmental Protection Expenditures and Jobs
In the U.S. Economy, 1970 - 2020

	Expenditures (billions of 2003 dollars)	Jobs (thousands)
1970	$39	704
1975	77	1,352
1980	121	2,117
1985	158	2,838
1990	204	3,517
1995	235	4,255
2003	301	4,974
2010	357	5,392
2015	398	5,756
2020	$442	6,377

Source: Management Information Services, Inc., 2004.

For comparison, it is interesting to note that if "EP" were a corporation, it would rank higher than the top of the Fortune 500. Also, for comparison, MISI's estimate of 2003 EP expenditures ($301 billion) ranks it higher than the sales of $259 billion for Wal-Mart, the largest corporation in the U.S.

Many companies, whether they realize it or not, owe their profits -- and in some cases their existence -- to EP expenditures.[1] Many workers, whether they realize it or not, would be unemployed were it not for these expenditures: In 2003 environmental protection created nearly five million jobs distributed widely throughout the nation. To put this into perspective, the size of environment-related employment is:

- Over ten times larger than employment in the U.S. pharmaceuticals industry
- Nearly six times larger than the apparel industry
- Almost three times larger than the chemical industry
- Fifty percent greater than employment in religious organizations
- Nearly half the employment in hospitals
- Almost one-third the size of the entire construction industry

Further, while MISI forecasts that the rate of growth in expenditures for environmental protection will decline over the next decade, real expenditures will continue to increase substantially.[2]

Are Environmental Jobs "Productive?"

It is sometimes suggested that investments in environmental protection are "nonproductive," i.e., expenditures lots of money on anything -- for example, building pyramids in the desert – would stimulate industry and create jobs. However, environmental protection is hardly "make work." EP investments build tangible and intangible long-term assets, not the least among them is a healthier, safer, cleaner, and more livable environment nationwide and in Florida -- an important recruiting factor in attracting the new "high tech" firms strongly courted by all states, not to mention residents, tourists, high-visibility events, and investors.

Environmental protection is an exemplary public good, and according to the Harris pollsters this issue has consistently enjoyed wider and stronger public support

[1]In this report, "expenditures" refers to all public and private spending in the environmental sector (EP spending) and is used interchangeably with "sales."

[2]The rate of growth declines because the total size of the industry continues to increase.

than virtually any other issue over the past three decades. Investments in plant and equipment which produce this strongly desired public good are as productive as those that produce automobiles, television sets, golf balls, or defense systems that we are willing to pay for directly in the prices of products or indirectly through the government.

It is also sometimes alleged that environmental standards penalize certain states and regions at the expense of others. While this can be sometimes true, the point has been overused. MISI's research does not support the contention that economic hardship in a given state or region can be blamed on "unreasonable" environmental laws. Further, MISI has found that the overall relationship between state environmental policies and economic/job growth is positive, not negative.

It is significant that many environmental economic and employment benefits flow directly to states whose policymakers and government officials often see only costs and disadvantages from environmental protection.[3] Funds expended on pollution abatement and control programs are not wasted, but, rather, investments in environmental protection contribute as much to the well-being and labor markets of the nation and individual states as money spent on other goods competing for scarce private and public funds. All regions and states benefit substantially, and many states benefit at greater than proportionate rates from U.S. EP expenditures.

Over the past three decades protecting the environment has been a major public priority. The legislation enacted has significantly improved the nation's environment and has set in motion ongoing programs that will have significant effects on the nation's environment, economy, and job market well into the 21st century. Importantly, protection of the environment and remediation of environmental problems will continue to be a growing and profitable industry in the U.S. Astute businessmen, labor leaders, government officials, and policymakers should become more cognizant of opportunities inherent in the environmental industry.

II.B. Environmental Protection as a Recession Proof Industry

Expenditures to protect the environment has been one of the most rapidly and consistently growing "recession proof" industries in the economy for the past three decades, and real EP expenditures (2003 dollars) increased from $39 billion in 1970 to $301 billion in 2003. This represents nearly an eight-fold increase in expenditures in barely more than three decades -- a sustained real average rate of growth of about eight percent per year over the period. This compares with an average annual rate of

[3]For example, in 1989 MISI assessed the economic and jobs impacts of acid rain control legislation and found that, contrary to what was then widely believed, such legislation would actually create 7,400 more jobs in Florida than it would imperil. See Roger H. Bezdek and Robert M. Wendling, "Acid Rain Abatement Legislation – Costs and Benefits," *International Journal of Management Science*, Vol. 17, No. 3 (1989), pp. 251-261. More recently, in a study of vehicle fuel efficiency standards, MISI found that – contrary to the common perception -- enhanced CAFE standards would create a large number of jobs (9,100) in Florida. See Roger H. Bezdek and Robert M. Wendling, "Potential Long-term Impacts of Changes in U.S. Vehicle Fuel Efficiency Standards," *Energy Policy*, Vol. 33, No. 3, pp. 407-419.

growth of GDP that averaged between two and three percent over the same period. That is, since the late 1960s, expenditures for pollution abatement and control has been increasing at a rate nearly three times as large as that of GDP.

As might be expected, this rate of growth has not been consistent. In the early 1970s, EP expenditures were increasing nearly 15 percent per year, by the late 1980s they were increasing at about seven percent annually, and by the late 1990s were increasing at about four percent annually. This is to be anticipated as the industry grew and matured -- but even the most recent growth rates of four percent are higher than the growth rate of GDP. In 1970, EP expenditures accounted for 0.9 percent of GDP, whereas by 2003 the U.S. was devoting about three percent of GDP to pollution control and abatement and related environmental programs.

More interesting, perhaps, is the "recession-proof" nature of this industry:

- In the late 1970s the U.S. economy was reeling from inflationary shocks, record interest rates, energy crises, and anemic economic growth, but between 1975 and 1980 EP expenditures grew nearly 60 percent, from $77 billion to $121 billion.

- In the early 1980s the U.S. experienced the most severe economic recession in half a century, with many industries experiencing depression-level problems, but between 1980 and 1985 EP expenditures increased by $37 billion -- 31 percent.

- During the early 1990s the U.S. experienced a relatively mild recession, with GDP declining one percent and unemployment increasing to 7.5 percent; nevertheless, between 1990 and 1995 EP expenditures increased from $204 billion to $235 billion -- 15 percent.

- Between 2000 and 2003, while U.S. economic and job growth was generally anemic, the EP industry expanded continuously, growing to $301 billion.

However, MISI forecasts that the rate of growth of EP expenditures will gradually decline over the next decade, as the industry grows and matures.

II.C. The Current Size and Structure of the Environmental Industry and Jobs Created

As stated earlier, if "EP" were a corporation, it would rank higher than the top of the Fortune 500:

- MISI estimates that in 2003 EP expenditures totaled $301 billion.

- In 2003, Wal-Mart, the largest U.S. corporation, had sales of $259 billion.

- In 2003, the number two U.S. corporation, Exxon Mobil, had sales of $213 billion, while the third-ranked corporation, General Motors, had sales of $196 billion.

Clearly, providing the goods and services required for environmental protection has become a major U.S. industry with significant effects on the national economy and labor market and on those of individual states.[4]

MISI estimates that in 2003 protecting the environment generated:

- $301 billion in total industry sales

- $20 billion in corporate profits

- 4.97 million jobs

- $45 billion in Federal, state, and local government tax revenues

II.D. Prospects for the Future

It is likely that the environmental industry will continue to grow for the foreseeable future:

- The environmental industry has grown and matured over the past four decades into a large, viable industry.

- Environmental processes and practices have been incorporated into most manufacturing and service industries.

- Pollution prevention is increasingly being utilized instead of “end of the pipe” pollution abatement remedies, and entire manufacturing process are being designed to limit environmental degradation from the beginning of the production process.

[4]All estimates of the size of the environmental industry rely critically on the exact definition of the industry. Since there is no official definition, estimates of the size of the environmental industry differ according to the source. In MISI's case, the definition of the industry includes human and environmental sustainability principles, and MISI’s estimates thus include a broader range of environmental activities in the economy than some other definitions that have been developed.

- Over the years, a large number of environmental regulations have been enacted at the local, state, and Federal levels and will continue to generate requirements for environmental technology and services well into the future -- even in the unlikely event that no new environmental regulations are enacted.

- Environmental protection and regulation is strongly desired by the public, as verified in numerous public opinion polls conducted over the past 30 years.

- As the U.S. economy continues to grow, environmental problems resulting from urban sprawl, environmental degradation, energy consumption, increasing population, traffic congestion, mobile source pollution, and related problems will continue to increase the demand for environmental remediation.

- The public is increasingly being given the choice of purchasing environmentally benign products and "green" energy, and is responding favorably. Major corporations -- such as, for example, Ford and British Petroleum -- have noted this preference and are reorienting themselves as environmentally friendly companies.

- Problems that the U.S. and the rest of the world face in the future will likely increase the demand for environment-related technology, services, and labor. To cite the most obvious example, global warming presents a long-term challenge that is being addressed by various international and national legislative and mandatory regulatory initiatives such as the Kyoto protocol, the McCain-Lieberman bill in the U.S. Senate, and the Climate Stewardship Act in the U.S. House of Representatives. Also, individual states have begun to establish and institute climate action plans. Thus, mitigating climate change and reducing and managing greenhouse gas emissions will likely create demand for hundreds of billions of dollars of output from the environmental, energy efficiency, and renewable energy industries.

MISI anticipates that the environmental industry will continue to grow slightly faster than U.S. GDP over the coming decade, although this rate of growth will gradually diminish and will approach that of GDP. This is to be expected, since the industry has grown large and matured. Nevertheless, it will likely continue to be relatively "recession proof" because it is largely driven by statues and regulations that must be complied with irrespective of the state of health of the nation's economy.

Thus, Table 1 indicates that MISI forecasts EP to continue to be a growing, recession proof industry well into the 21st century, offering unique entrepreneurial, profit, and job opportunities for all types of businesses and workers. **MISI forecasts**

that in the U.S. real expenditures (2003 dollars) will increase from $301 billion in 2003 to:

- $357 billion in 2010
- $398 billion in 2015
- $442 billion in 2020

Environmental protection expenditures generate large numbers of jobs throughout all sectors of the economy and within many diverse occupations. As shown in Table 1, MISI forecasts that U.S. employment created directly and indirectly by EP expenditures will increase from 4.97 million jobs in 2003 to:

- 5.39 million jobs in 2010
- 5.76 million jobs in 2015
- 6.38 million jobs in 2020

Until the U.S. reaches a level of creating and managing a sustainable environment, the environmental protection industry will continue to outpace most other industries in the U.S. economy. Until then, the environmental industry is projected to grow at a rate 2-3 percent faster than many other industries.

These major economic opportunities have tended to go overlooked by economic development policymakers and government officials. Nevertheless, significant economic opportunities do exist and can be maximized and leveraged for broad social and environmental advantage.

III. DEFINING AND ESTIMATING ENVIRONMENTAL JOBS

III.A. What Constitutes an Environmental Job?

Ambiguities and Questions

As discussed in Chapter II, environmental protection created nearly five million jobs in the U.S. in 2003, and these were distributed widely throughout all states and regions within the U.S. But how many of these are "environmental jobs" or "green jobs?" More specifically, what constitutes an "environmental job?" While a definitive analysis of this important topic is outside the scope of this report, our review of the literature indicates that there is no rigorous, well-accepted definition of an environmental job. Rather, the definitions used are often loose and contradictory.

Clearly, an ecologist or an environmental engineer working in private industry or for an environmental advocacy organization would constitute an environmental job, as would an employee of the federal or a state environmental protection agency. However, there are ambiguities. For example, most people would agree that the positions in a firm that assembles and installs solar thermal collectors on residences and commercial office buildings for solar heating and solar hot water heating would be considered environmental jobs. But what about the jobs involved in producing those solar panels, especially if the factory involved used coal-based energy, one of the most controversial fossil fuels in terms of emissions, especially greenhouse gases? Here these manufacturing jobs are included as jobs created indirectly by environmental expenditures.

Most analysts would consider jobs in a recycling plant to be environmental jobs. But what if the recycling plant itself produces air pollution?

What about a firm in Florida that produces emissions control equipment for power plants in Alabama? It seems clear that the jobs in the Florida company should be considered green or environmental jobs, even though the user of the equipment in Alabama may cause pollution in Florida.

What about environmental engineers and environmental controls specialists working in a coal-fired power plant? What about the workers who produce environmental control equipment for the plant?

There are many manufacturing establishments throughout the United States that produce products for the automotive industry. Should those that produce components for fuel-efficient vehicles be considered part of the environmental industry, but not those that produce components for gas guzzlers? If so, is there any way to accurately distinguish between these? Should all factories producing catalytic converters be considered environmental jobs, even when some of these converters are used on low miles-per-gallon vehicles?

These relevant questions have, in fact, been generated by shifts in environmental policy itself. The early stages of the environmental movement in the 1970s and 1980s focused primarily on "end-of-the pipe" solutions. That is, the remedies and controls focused on cleaning or minimizing air, water, or solid waste pollutants after they had been produced. However, more recently during the 1980s and 1990s, environmental protection has gradually evolved to include entire processes, so, rather than cleaning up at the end of the pipe, the entire manufacturing and servicing processes are being designed to minimize the production of pollutants. Therefore, it is possible that very efficient processes designed to produce relatively little waste output could actually result in a decrease in the number of environmental jobs if these are defined strictly as “end of the pipe” jobs. A widespread program of energy efficiency, energy conservation, and demand-side management could ultimately result in less need for electric power to begin with and could result in the shutting down of a coal-fired electric power plant. While some may view such a shutdown as and environmental plus, many environmental jobs in that power plant involving pollution abatement and control would be in this case lost. Is this jobs loss desirable?

There is also the issue of how to take account of indirect job creation and how broadly or narrowly to define an indirect environmental job. For example, what of ancillary jobs created across the street from a factory producing solar collectors shortly after it opens, such as a doughnut shop, fast food restaurant, dry cleaner, etc. whose customers are primarily the workers at the renewable energy factory. Are these latter jobs also considered to be “indirect” green jobs or environmental jobs? We include such indirect jobs in this report, though we also conclude they are not “as green” as the direct jobs created.

While solid waste abatement and control is a major area of environmental concern, does this imply that all persons engaged in trash collection business are performing environmental jobs?

What part of the tourism industry constitutes “ecotourism,” and are all jobs associated with ecotourism green jobs? Are then all the environmental externalities and costs produced by tourists, such as water use or waste, to be forgiven if these tourists are engaged in ecotourism?

Are all land management programs and all forms of alternative energy green industries, with all jobs counting as environmental jobs?

Definitions and Concepts Used in This Report

MISI considers that jobs can be considered to be “green” relative to the way the job was performed previously, i.e., in a production process, a change in technology that reduces waste emissions or energy consumption makes the jobs in that process “greener” than before. Still, can these jobs continue to be counted as environmental

jobs when newer technology makes available ways of furthering green production, e.g., further reducing energy consumption?

Two approaches can be used to address the relativity cited. The first approach targets environmental jobs, which could be new jobs or the greening of existing jobs, and defines a green job as one that emphasizes activities that contribute to environmentally sustainable development. A second approach focuses on the economy as a whole, defining a green economy as an economy that is environmentally sustainable, and environmental jobs as those jobs required to make an economy environmentally sustainable. Similarly, the term "environmental sector" is used to collectively describe companies involved in businesses designed to limit negative environmental impacts. However, this definition of green jobs as employment opportunities arising from expenditures on activities that support environmentally sustainable development, or which reduce negative impacts on the environment, also presents ambiguities.

Therefore, based on extensive research and literature review, MISI considers that environmental jobs are perhaps best understood when viewed in a continuum across a spectrum, with jobs that generate obvious environmental resource degradation or extraction at one end; a range of greener jobs involving clean production measures and technologies to reduce environmental impacts in the center, and the other end of the spectrum where jobs have a positive environmental impact (see Figure 1).

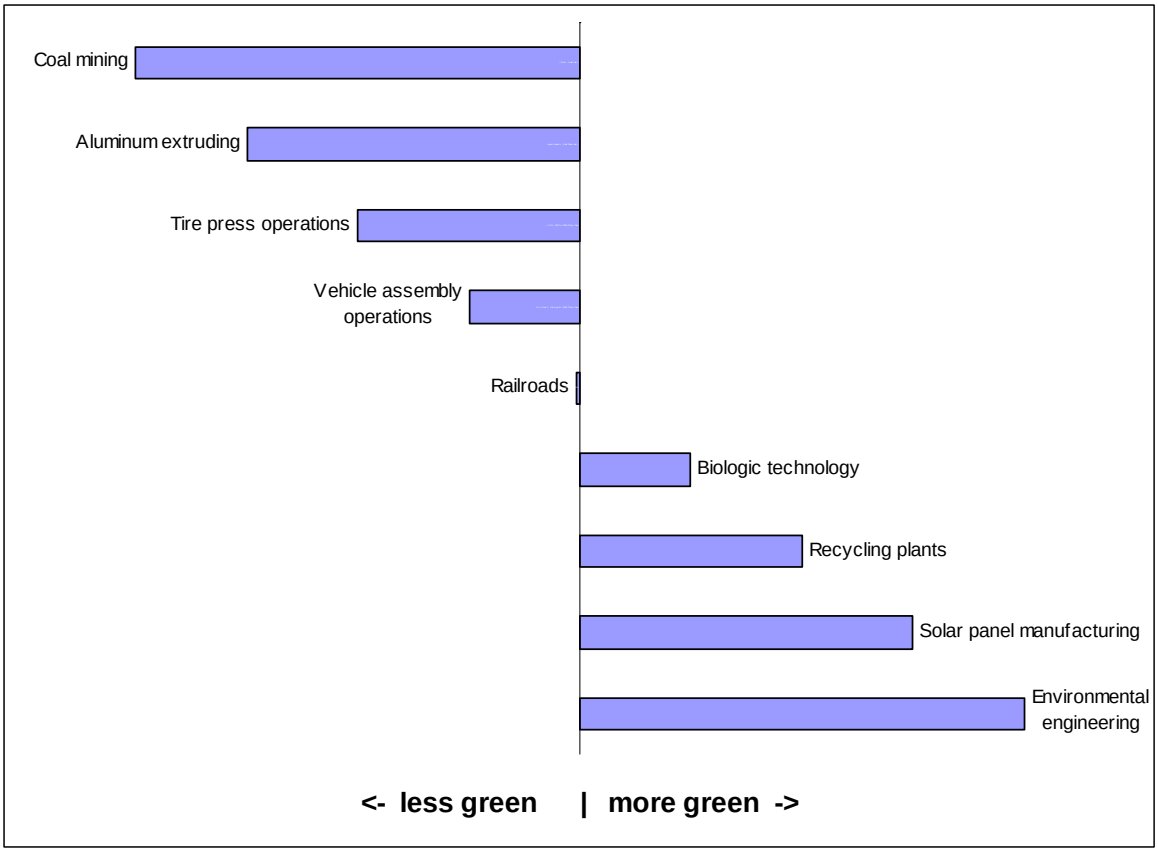
Using the spectrum concept, MISI defines environmental industries and green jobs as those which, as a result of environmental pressures and concerns, have produced the development of numerous products, processes, and services, which specifically target the reduction of environmental impact. Environment-related jobs include those created both directly and indirectly by environmental protection expenditures.

III.B. Types of Jobs Created in the Environmental Industry

There exists relatively little rigorous and comprehensive research addressing the practical relationship between environmental protection and existing jobs or future job creation. Even some research in this area sponsored by environmental organizations is off the mark, in that it has tended to emphasize jobs creation in classically green activities, such as environmental lawyers or workers in recycling plants.

However, while these jobs certainly count as jobs related to the environment, MISI's data suggests that the classic environmental job constitutes only a small portion of the jobs created by environmental protection. The vast majority of the jobs created by environmental protection are standard jobs for accountants, engineers, computer analysts, clerks, factory workers, truck drivers, mechanics, etc. In fact, most of the persons employed in these jobs may not even realize that they owe their livelihood to protecting the environment.

Figure 1
The Environmental Job Spectrum

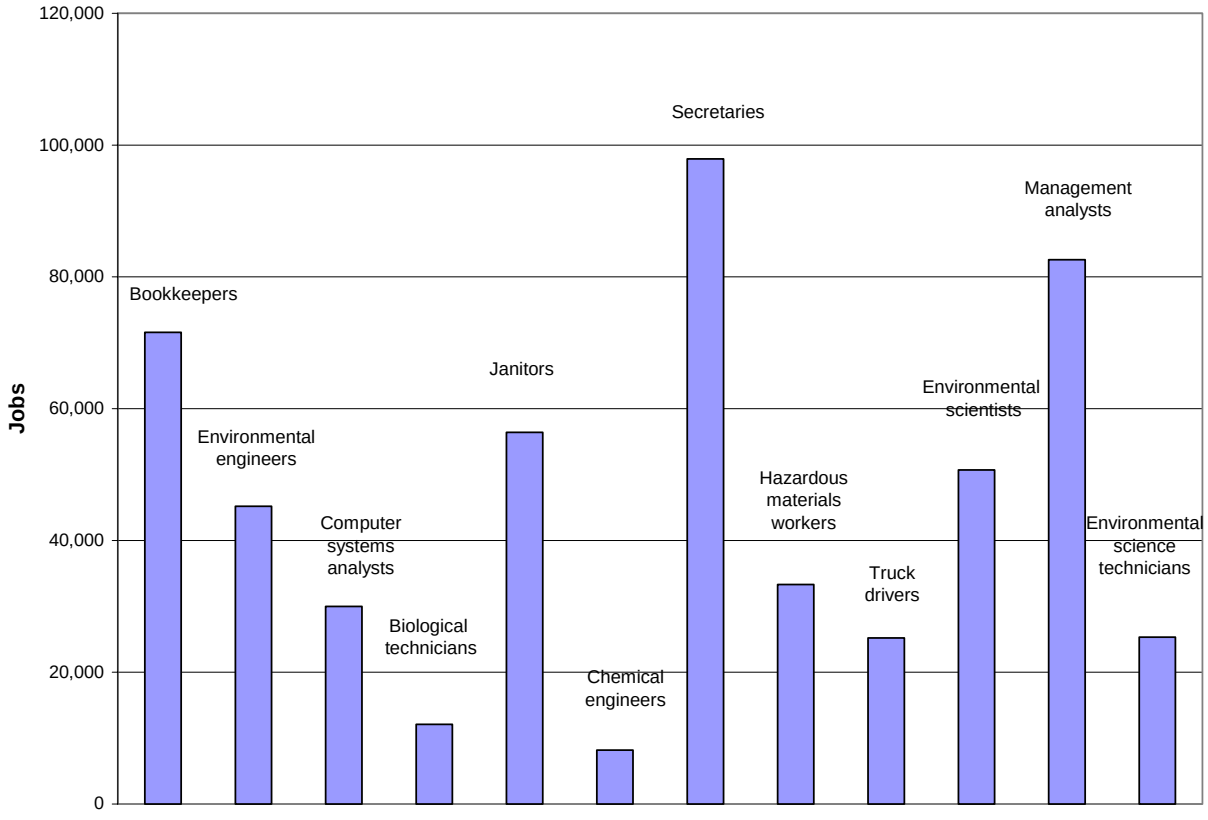


Source: Management Information Services, Inc., 2004.

For example, as illustrated in Figure 2, in the U.S. in 2003, environmental protection created:

- More jobs for secretaries (97,900,) than for environmental scientists (50,700).
- More jobs for management analysts (82,600) than for environmental engineers (45,200).
- More jobs for bookkeepers (71,600) than for hazardous materials workers (33,300).
- More jobs for janitors (56,400) than for environmental science technicians (25,000).

Figure 2
Selected U.S. Jobs Created in 2003 by Environmental Expenditures



Source: Management Information Services, Inc., 2004.

- More jobs for computer systems analysts (30,000) than for chemical engineers (8,200)

- More jobs for truck drivers (25,200) than for biological technicians (12,100)

More generally, arguments stressing the economic benefits and job creation resulting from environmental protection and clean energy initiatives are not currently being made in a rigorous manner which disaggegates these benefits to a level of detail that is meaningful to policymakers. The level of detail required is at the sector, industry, state, city, and county level, and the jobs created have to be identified by industry, category, skill, and specific occupation at the state and local level. This report provides data at such levels of detail.

III.C. The Jobs Distribution in Typical Environmental Companies

There are many thousands of environmental companies located throughout the United States and they generate jobs for nearly five million workers in virtually every community. These firms:

- Range from the very small one or two person “mom and pop” shops to very large firms employment thousands of workers.
- Employ workers at all levels of skills, from the most basic and rudimentary to the very high skilled technical and professional
- Include environmental service firms and manufacturing firms
- Include those whose market is local, those whose market is state and regional, those who market is national, and those whose market is international.
- Face the same problems, challenges, and opportunities as other companies

Given the wide diversity in the size, function, and technologies of environmental companies, it is impossible to estimate the job profile of the “average” environmental firm. However, it is possible to identify the jobs and earnings profiles of typical types of firms involved in environment-related areas of work. Tables 2 and 3 illustrate this:

- Table 2 shows the 2003 occupational job distribution and employee earnings of a typical environmental remediation services company.
- Table 3 shows the 2003 occupational job distribution and employee earnings of a typical wind turbine manufacturing company.

These tables illustrate the points made above.

First, firms working in the environmental and related areas employ a wide range of workers at all educational and skills levels and at widely differing earnings levels.

Second, in environmental companies, many of the employees are not classified as “environmental specialists.” For example, even in the environmental remediation services firm profiled in Table 2, most of the workers are in occupations such as laborers, clerks, bookkeepers, accountants, maintenance workers, cost estimators, etc. All of these employees owe their jobs and livelihoods to environmental protection, but, in general, they perform the same types of activities at work as employees in firms that have little or nothing to do with the environment.

This is illustrated even more forcefully in Table 3. The occupational job distribution of a typical wind turbine manufacturing company differs relatively little from that of a company that manufactures other products. Thus, the production of wind turbines and wind turbine components requires large numbers of engine assemblers, machinists, machine tool operators, mechanical and industrial engineers, welders, tool and die makers, mechanics, managers, purchasing agents, etc. These are "environmental" workers only because the company they work for is manufacturing a renewable energy product. Importantly, with the current national angst concerning the erosion of the U.S. manufacturing sector and the loss of U.S. manufacturing jobs, it is relevant to note that many environmental and renewable energy technologies are growing rapidly.[5] In at least some states, these types of firms can help revitalize the manufacturing sector and provide the types of diversified, high-wage jobs that all states seek to attract.

[5]For example, windpower is the most rapidly growing source of electrical power in the world.

Table 2
Typical Employee Profile of a 100-person
Environmental Remediation Services Company, 2003

Occupation	Employees	Earnings
Hazardous Materials Removal Workers	22	$36,204
Septic Tank Servicers and Sewer Pipe Cleaners	8	30,419
Construction Laborers	7	32,382
First-Line Supervisors/Managers of Construction/Extraction	5	50,673
Truck Drivers, Heavy and Tractor-Trailer	5	33,044
General and Operations Managers	3	86,258
Laborers and Freight, Stock, and Material Movers	2	21,620
Truck Drivers, Light Or Delivery Services	2	27,437
Office Clerks	2	23,384
Refuse and Recyclable Material Collectors	2	26,796
Insulation Workers	2	32,256
Secretaries (except Legal, Medical, and Executive)	2	25,998
Bookkeeping, Accounting, and Auditing Clerks	2	31,217
Plumbers, Pipefitters, and Steamfitters	1	41,202
Executive Secretaries and Administrative Assistants	1	36,729
Maintenance and Repair Workers	1	30,849
Environmental Engineering Technicians	1	36,939
Operating Engineers and Other Const. Equip. Operators	1	40,520
First-Line Supervisors/Managers of Office/Administrative	1	47,576
Chief Executives	1	116,435
Construction Managers	1	73,994
Cleaners of Vehicles and Equipment	1	21,704
Cost Estimators	1	56,753
Janitors and Cleaners	1	25,746
Environmental Engineers	1	69,930
Industrial Truck and Tractor Operators	1	27,741
Carpenters	1	38,588
Construction and Maintenance Painters	1	33,296
Accountants and Auditors	1	53,865
Dispatchers (except Police, Fire, and Ambulance)	1	29,537
Water and Liquid Waste Treatment Plant and System Operators	1	31,049
First-Line Supervisors/Managers of Transportation Operators	1	46,914
Sales Representatives, Wholesale and Manufacturing	1	42,683
Customer Service Representatives	1	30,366
First-Line Supervisors/Managers of Mechanics and Repairers	1	49,088
Environmental Scientists and Specialists	1	62,003
Receptionists and Information Clerks	1	22,775
Environmental Science and Protection Technicians	1	44,867
Other employees	12	47,422
Employee Total	100	$39,621

Source: Management Information Services, Inc., 2004.

Table 3
Typical Employee Profile of a 250-person
Wind Turbine Manufacturing Company, 2003

Occupation	Employees	Earnings
Engine and Other Machine Assemblers	31	$33,359
Machinists	27	37,191
Team Assemblers	16	27,668
Computer-Controlled Machine Tool Operators	12	37,254
Mechanical Engineers	10	65,772
First-Line Supervisors/Managers of Production/Operating	10	54,705
Inspectors, Testers, Sorters, Samplers, and Weighers	8	37,202
Lathe and Turning Machine Tool Setters/Operators/Tenders	6	36,729
Drilling and Boring Machine Tool Setters/Operators/Tenders	4	36,509
Welders, Cutters, Solderers, and Brazers	4	36,530
Laborers and Freight, Stock, and Material Movers	4	28,466
Maintenance and Repair Workers	4	41,318
Tool and Die Makers	4	40,047
Grinding/Lapping/Polishing/Buffing Machine Tool Operators	4	31,899
Multiple Machine Tool Setters/Operators/Tenders	4	37,517
Industrial Engineers	3	64,659
Industrial Machinery Mechanics	3	42,315
Engineering Managers	3	99,404
Shipping, Receiving, and Traffic Clerks	3	29,516
General and Operations Managers	3	110,702
Industrial Production Managers	3	85,512
Industrial Truck and Tractor Operators	3	31,416
Purchasing Agents	3	51,702
Cutting/Punching/Press Machine Setters/Operators/Tenders	3	28,907
Production, Planning, and Expediting Clerks	3	41,601
Milling and Planing Machine Setters/Operators/Tenders	3	37,380
Mechanical Drafters	2	44,090
Customer Service Representatives	2	36,036
Bookkeeping, Accounting, and Auditing Clerks	2	32,760
Office Clerks, General	2	27,227
Sales Representatives, Wholesale and Manufacturing	2	50,757
Janitors and Cleaners	2	28,476
Sales Engineers	2	66,591
Accountants and Auditors	2	54,873
Tool Grinders, Filers, and Sharpeners	2	40,520
Executive Secretaries and Administrative Assistants	2	39,638
Mechanical Engineering Technicians	2	46,767
Electricians	2	45,570
Other employees	48	45,969
Employee Total	250	$42,726

Source: Management Information Services, Inc., 2004.

IV. THE FLORIDA ECONOMY IN 2003

The Florida economy had one of the strongest performances among states in 2003. The increase in state personal income exceeded the national average gain for the third consecutive year, rising 3.6 percent from 2002 to 2003. Per capita income, while increasing in 2003 to almost $30,000, remained just over 95 percent of the U.S. average of $31,459. Gross state product has steadily increased over the past three years and reached $525 billion in 2003, and Florida's contribution to national GDP also continued to increase and reached 5.3 percent in 2003. Florida's population has increased an estimated 6.1 percent since the 2000 decentennial census, a rate twice the nation's 3.0-percent growth rate. Florida also passed the 17-million mark in population in 2003 and remained the nation's fourth largest state, lagging only New York, Texas, and California.

The civilian labor force grew by around 80,000 from 2002 to 2003, reaching an all-time monthly high of 8,206,000 by the end of 2003. State employment more than kept pace, adding over 110,000 new jobs during the year, and unemployment declined to under 400,000 for the first time in two years. Florida's unemployment rate declined steadily throughout 2003, from 5.3 percent to 4.9 percent, and by year's end the rate was 0.8 percentage points lower than the national average of 5.7 percent.

Florida is one of the largest U.S. states and is one of the largest economies in the world. Florida[6]:

- Is the nation's fourth most populous state
- Has the fourth largest labor force
- Has the fourth highest number of business establishments
- Has the fourth largest Gross State Product, making it the eighth largest economy in the western hemisphere, and the 15th largest economy in the world
- Ranks fourth in total employment in high-tech industries
- Is the ninth largest producer of exported goods
- Is the ninth largest recipient of Foreign Direct Investment

As a leading high tech state, Florida has a large and robust technology base, and a strong historical role in pushing the technology envelope, and ranks[7]:

[6]Enterprise Florida: www.eflorida.com

- Third in highest dollar volume of high-tech exports
- Fourth in highest number of high-tech workers
- Fourth in highest number of high-tech establishments
- Third in telecommunications services employment
- Fourth in engineering services employment
- Fourth in Internet services employment
- Fourth in communications equipment manufacturing employment
- Fourth in electronic components manufacturing employ*ment*
- Fourth in aviation/aerospace *employment*
- Fifth in total high-tech services employment
- Fifth in total high-tech manufacturing employment
- Fifth in defense electronics manufacturing employment
- Fifth in photonics manufacturing employment

Florida has long been at the forefront of technological advances. From the birth of the nation's space program in the 1950s in Cape Canaveral, to work with early laser technology during the 1960s in Central Florida, to the development of the IBM personal computer in Boca Raton in the early 1980s, Florida has played a strong history of pushing the technology envelope. Florida's strengths lie in the following key sectors[8]:

- Life Sciences (including Biotechnology, Medical Dev Pharmaceuticals, Health Care)
- Information Technology (including IT Products/Sen Development
- Modeling/Simulation/Training, Photo Microelectronics, Telecommunications)
- Aviation/Aerospace

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[7]Ibid.

[8]Ibid.

- Homeland Security/Defense
- Financial / Professional Services
- Manufacturing

Table 4 shows the earnings by industry of employment in Florida and how these compare to the U.S. averages. This table shows that Florida ranks relatively low with respect to sectors such as mining, manufacturing, information, management, and education. However, this illustrates that Florida ranks high with respect to several sectors: Specifically, with 5.9 percent of the nation's population:

- Employment earnings in the Florida administrative and support sector account for 9.6 percent of total earnings nationally in that sector.
- Employment earnings in the Florida arts, entertainment, and recreation sector account for 8.7 percent of total earnings nationally in that sector.
- Employment earnings in the Florida accommodation and food service sector account for 6.7 percent of total earnings nationally in that sector.

The Tourism Industry and Jobs in Florida

Tourism and environmental protection are closely related everywhere a tourism industry exists, since clean coasts, beaches, and attractive natural settings are pre-requisites for successful general tourism, but especially tourism that is significantly ocean and coast-related, as in Florida. Without destinations that include access to and settings extant with clean water, clean land, and clean air, tourism could not occur. Similarly, such environmental phenomena as climate change can influence the long-term success of tourism if, for example, storms and hurricane events increase, or if shifts occur in historic weather patterns, or landscape features, such as type and health of forest cover, that are often the essence of tourism appeal.

While the resort and tourism industries are not classified in or considered part of the environmental industry as defined in our report, certain jobs in these industries do fall within the environmental industry as defined in the current study. Therefore, our analysis of environmental jobs in Florida includes a subset of tourism industry employees who deal with environmental activities on a day-to-day basis. This would include, for instance, employees who ensure clean water, land, and air attributes of the tourist activity. For instance, a greater percentage of employees in an "eco-tourism" company would be classified as part of the environmental industry in Florida than a typical staff at a beach-front hotel.

The tourism industry in Florida is a major economic force. In 2001, travelers in Florida spent a total of $56 billion, according to an analysis of tourism data released by the Travel Industry Association of America.[9] The same report attributed 540,500 direct and indirect jobs created in Florida due to traveler spending.

It is also true, however, that states such as Florida seek diversity in their economic base, given the vulnerability of tourism and tourist infrastructure to vagaries of weather and tourist habit. Also, frequently jobs in the tourism industry are seasonal, part-time, and low-paying relative to jobs in other sectors. Results of this report suggest that the "environment industry," outside of conventional tourism, represents a desirable option for economic diversification. To the extent that environmental companies in Florida undertake projects in Florida that improve the safety and appeal of tourism-related infrastructure or features, these companies help underpin the long-term viability of the state's tourism industry as well.

Table 4
Earnings by Industry of Employment in Florida and the U.S. in 2003

	Florida (millions)	Florida Share of U.S.		Florida Share of Earnings	U.S. Share of Earnings	Florida Index
Personal Income (including adjustments)	$ 510,090	5.6%		-	-	-
Agriculture, Forestry, Fishing and Hunting	3,267	4.4%		0.9%	1.0%	91
Mining	436	0.8%		0.1%	0.8%	16
Utilities	3,076	4.2%		0.9%	1.0%	86
Construction	23,528	5.5%		6.8%	6.1%	113
Manufacturing	22,362	2.3%		6.5%	13.4%	48
Wholesale Trade	18,897	5.2%		5.5%	5.1%	107
Retail Trade	28,450	5.9%		8.3%	6.8%	121
Transportation and Warehousing	10,860	4.7%		3.2%	3.3%	97
Information	11,921	4.3%		3.5%	3.9%	89
Finance and Insurance	23,916	4.5%		6.9%	7.5%	93
Real Estate and Rental and Leasing	10,636	6.1%		3.1%	2.5%	125
Professional, Scientific, and Technical Services	29,150	4.5%		8.5%	9.1%	93
Management of Companies and Enterprises	5,210	3.6%		1.5%	2.0%	74
Administrative/Support/Waste Management/Remediation Services	24,515	9.6%		7.1%	3.6%	198
Educational Services	3,537	3.8%		1.0%	1.3%	78
Health Care and Social Assistance	36,875	5.5%		10.7%	9.4%	113
Arts, Entertainment, and Recreation	6,698	8.7%		1.9%	1.1%	179
Accommodation and Food Services	13,010	6.7%		3.8%	2.7%	137
Other Services	12,136	5.7%		3.5%	3.0%	117
Public Administration	56,235	4.8%		16.3%	16.3%	100

Source: Management Information Services, Inc., 2004.

[9]Travel Industry Association of America, *Tourism Works for America, 12th Annual Edition 2003*, Washington, D.C, December 2003.

V. THE ENVIRONMENTAL INDUSTRY AND JOBS IN FLORIDA

V.A. Summary of the Environmental Industry and Jobs in Florida

MISI estimates that in 2003:

- Sales generated by environment-related industries in Florida totaled $15.4 billion.
- The number of environment-related jobs totaled 220,000 – compared to 540,000 jobs created in Florida by tourism.
- The environmental industry in Florida comprised three percent of gross state product.
- Florida environmental industries accounted for five percent of the sales of the U.S. environmental industry.
- Environment-related jobs comprised three percent of Florida employment.
- Environment-related jobs in Florida comprised 4.4 percent of the total number of environment-related jobs in the U.S.
- Environment-related employment in the state has been increasing in recent years between one and two percent annually.

V.B. Environmental Jobs in Florida by Industrial Sector

Table 5 shows the industrial distribution of total employment and of environmental employment in Florida in 2003.

Comparison of the industrial sector distribution of environment-related jobs in Florida with that of total employment in the state is instructive. A significant portion of the environmental jobs is in the public administration sector which, given the public nature of environmental protection, is to be expected. However, most of the environmental jobs in Florida are in the private sector, and focusing on these reveals that they are heavily concentrated in several sectors. Of particular note is that the private sector environmental industry in Florida is more manufacturing intensive than other average private sector activity in the state:

Table 5
Environmental-Related Jobs in Florida in 2003, by Industry

Industry	Establishments	Total Employment	Environmental Employment	Environmental Jobs (percent)
Agriculture, Forestry, Fishing and Hunting	1,080	2,300	192	8.3
Mining	246	4,900	459	9.4
Utilities	649	26,800	4,973	18.6
Construction	41,627	445,900	9,966	2.2
Manufacturing	13,983	388,800	9,849	2.5
Wholesale Trade	30,299	313,200	3,692	1.2
Retail Trade	68,737	920,400	5,833	0.6
Transportation and Warehousing	10,136	202,100	1,300	0.6
Information	6,862	171,800	4,278	2.5
Finance and Insurance	27,952	330,900	1,962	0.6
Real Estate and Rental and Leasing	24,524	153,400	1,680	1.1
Professional, Scientific, and Technical Services	55,180	384,400	28,606	7.4
Management of Companies and Enterprises	2,562	65,600	1,032	1.6
Administrative/Support/Waste Management/Remediation Services	29,383	807,500	41,971	5.2
Educational Services	4,816	108,400	3,198	3.0
Health Care and Social Assistance	44,561	777,200	4,364	0.6
Arts, Entertainment, and Recreation	5,882	157,200	1,030	0.7
Accommodation and Food Services	30,203	651,300	5,286	0.8
Other Services	45,247	317,800	3,107	1.0
Public Administration	-	1,055,500	86,723	8.2
State Total	**443,931**	**7,285,400**	**219,500**	**3.0**

Source: Management Information Services, Inc., 2004.

- 7.4 percent of private sector jobs in the environmental industry are in manufacturing, compared to 6.2 percent in manufacturing among all private sector industrial activities in Florida.

- 22 percent of private sector environmental jobs are in professional, scientific, and technical services, compared to six percent of all private sector jobs in the state.

- 32 percent of private sector environmental jobs are in administrative, support, and waste management services, compared to 13 percent of all private sector jobs in the state.

- 2.4 percent of private sector environmental jobs are in educational services, compared to 1.7 percent of all private sector jobs in the state.

Conversely, there are relatively few private sector environmental jobs in other parts of the Florida economy:

- Four percent of private sector environmental jobs are in the retail trade sector, compared to 15 percent in retail trade among all private sector jobs in the state.

- 1.5 percent of environmental jobs are in the finance and insurance sector, compared to 5.3 percent among all private sector jobs in the state.

- Three percent of environmental jobs are in the health care and social service sector, compared to 13 percent among all private sector jobs in the state.

- One percent of environmental jobs are in the transportation and warehousing sector, compared to three percent among all private sector jobs in the state.

Assessing the portion of total state employment in each industrial sector accounted for by environmental jobs indicates that the 220,000 environmental jobs account for about three percent of the total 7.3 million jobs in Florida. However, this distribution is uneven among industry sectors:

- 19 percent of employment in the utilities sector consists of environmental jobs, primarily water, waste treatment, sanitation, and related facilities.

- More than eight percent of public administration employment in the state consists of environmental jobs.

- More than seven percent of Florida jobs in the professional, scientific, and technical services are environmental jobs.

- **About 2.5 percent of the state's manufacturing employment is environment-related**

- Only very small portions of total state employment in sectors such as food services, entertainment, real estate, finance, insurance, and retail trade are comprised of environmental jobs.

Key Observations on Jobs Distribution

The concentration of environmental jobs within certain industrial sectors is instructive and interesting.

While accounting for three percent of total state employment, the industrial sector composition of environmental employment is highly skewed in favor of certain sectors. For example, more than seven percent of private sector environmental jobs are in manufacturing, compared to about six percent of all private sector employment, and nearly one-third of private sector environmental jobs are in professional, scientific, and technical services, compared to 13 percent of all private sector jobs in the state.

This indicates that investments in the environment will provide a greater than proportionate assist to Florida's high-tech and manufacturing sectors. As noted in Chapter IV, Florida is seeking to modernize and expand its high-tech industrial and manufacturing base. Table 5 indicates that the environmental industry can aid in this objective.

Similarly, **environmental investments generate, proportionately, 2.5 times as many jobs in professional, scientific, and technical services as the state average**. Jobs in this sector are the high-skilled, high-wage, technical and professional jobs that Florida – and other states – seeks to attract and retain. Table 5 indicates that investments in environmental protection can be of considerable assistance here.

V.C. Environmental Jobs in Florida by Occupation and Skill

Environmental employment in Florida can be disaggregated by specific occupations and skills, and this information for 2003 for selected occupations is given in Table 6. This table illustrates that environmental jobs in Florida are widely distributed among all occupations and skill levels and, while the number of jobs created in different occupations differs substantially, employment in virtually all occupations is generated by environmental spending.

As noted in Chapter III, the vast majority of the jobs created by environmental protection are standard jobs for accountants, engineers, computer analysts, clerks, factory workers, truck drivers, mechanics, etc. and most of the persons employed in these jobs may not even realize that they owe their livelihood to protecting the environment. This is borne out in Table 6, which lists the jobs created by environmental protection in Florida in 2003 within selected occupations. This table shows that in 2003 environmental protection generated in Florida generated:

Table 6
Environmental Jobs Generated in Florida in 2003, by Selected Occupations

Occupation	Jobs
Accountants and Auditors	1,272
Bookkeeping and Accounting Clerks	2,092
Cashiers	3,591
Chemists	242
Computer Software Engineers	1,873
Conservation Scientists	371
Customer Service Representatives	2,334
Electricians	708
Electronics Engineers	781
Environmental Engineers	2,545
Environmental Engineering Technicians	1,289
Environmental Scientists and Specialists	5,659
Executive Secretaries and Administrative Assistants	2,432
Financial Managers	684
Forest and Conservation Workers	199
Geoscientists	241
Graphic Designers	296
Hazardous Material Removal Workers	1,267
Inspectors, Testers, and Sorters	323
Janitors and Cleaners	1,827
Landscape Architects	313
Mechanical Engineers	250
Management Analysts	2,049
Marketing Managers	454
Medical Scientists, Except Epidemiologists	255
Natural Science Managers	207
Office Clerks	4,949
Pest Control Workers	1,161
Security Guards	1,614
Septic Tank Servicers and Sewer Pipe Cleaners	2,141
Sheet Metal Workers	821
Stock Clerks	2,587
Training and Development Specialists	431
Truck Drivers	2,870
Water and Liquid Waste Treatment Plant Operators	5,484
Welders and Solderers	328

Source: Management Information Services, Inc., 2004.

- More jobs for sheet metal workers (821) than for geoscientists (241)

- More jobs for office clerks (4,968) than for environmental engineers (2,545)

- More jobs for executive secretaries (2,432) than for landscape architects (313)

- More jobs for janitors (1,827) than for natural science managers (207)

- More jobs for electricians (708) than for chemists (242)

- More jobs for accountants and auditors (1,272) than for medical scientists (255)

- More jobs for truck drivers (2,870) than for septic tank servicers (2,181)

- More jobs for financial managers (684) than for conservation scientists (371)

- More jobs for management analysts (2,049) than for environmental engineering technicians (1,289)

- More jobs for computer software engineers (1,839) than for hazardous material removal workers (1,267)

Thus, many workers in Florida are dependent on environmental protection for their employment, although they often would have no way of recognizing that connection unless it is brought to their attention.

The importance of environmental spending for jobs in some occupations is much greater than in others. For some occupations, such as environmental scientists and specialists, environmental engineers, hazardous materials workers, water and liquid waste treatment plant operators, environmental science protection technicians, refuse and recyclable material collectors, and environmental engineering technicians, virtually all of the demand in Florida is created by environmental protection activities. This is hardly surprising, for most of these jobs are clearly identifiable as “environmental” jobs.

However, in many occupations not traditionally identified as environment-related, a greater than proportionate share of the jobs is also generated by environmental protection. Recalling that, on average, environment-related employment in Florida comprises only three percent of total employment, in 2003 environmental protection

expenditures generated jobs for a greater than proportionate share – as much as ten percent or more -- of many professional occupations in the state, including:

- Chemists
- Civil engineers
- Computer software engineers
- Electronics engineers
- Geoscientists
- Landscape architects
- Medical scientists
- Natural sciences managers
- Surveyors
- Urban and regional planners

For many other occupations, also not traditionally identified as environment-related, a greater than proportionate share of the jobs is also generated by environmental protection. Again recalling that, on average, environment-related employment in Florida comprises only three percent of total employment, in 2003 environmental protection generated jobs for as much as ten percent or more of many highly skilled, technical occupations in the state, including:

- Architectural and civil drafters
- Chemical technicians
- Civil engineering technicians
- Electrical and electronics engineering technicians
- Electrical and electronics equipment assemblers
- Electrical and electronics drafters
- Fiberglass laminators and fabricators

- Forest and conservation technicians
- Heating, air conditioning, and refrigeration mechanics and installers
- Industrial engineering technicians
- Surveying and mapping technicians

The above findings are significant for they indicate that state investments in environmental protection will create jobs in greater than proportionate share in two categories that Florida -- and other states -- are eager to attract:

- College-educated professional workers, many with advanced degrees
- Highly skilled, technical workers, with advanced training and technical expertise, many of them in the manufacturing sector

Environmental protection thus generates jobs that are disproportionately for highly skilled, well-paid, technical and professional workers, who in turn underpin and provide foundation for entrepreneurship and economic growth.

Finally, there are many occupations for which requirements in Florida generated by environmental protection are close to the average of three percent of total employment; including:

- Accountants and auditors
- Brickmasons
- Compensation, benefits, and job analysis specialists
- Construction laborers
- Electricians
- Electricians
- Financial managers
- Graphic designers
- Health information specialists

- Human resource managers
- Industrial machinery mechanics
- Interviewers
- Network and Computer systems Administrators
- Payroll clerks
- Plumbers and Pipefitters
- Purchasing agents
- Security guards
- Stock clerks
- Training and development specialists
- Truck drivers
- Welders

V.D. The Environmental Industry as an Economic Driver for Florida

This study demonstrates that environmental protection can form an important part of a strategy for Florida based on attracting and retaining professional, scientific, technical, high-skilled, well paying jobs, including manufacturing jobs. While a successful strategy must have other components as well, rarely has any state recognized the economic and jobs benefits that could flow from specifically encouraging the development of environmental and environment-related industries as an economic development initiative. Indeed, usually the opposite is the case: States tend to view environmental economic costs as economically negative.

An important finding derived here is the significance of the environmental industry in Florida compared to other sectors of the economy. For example, in Chapter IV it was noted that the tourism industry generates about 540,000 jobs in the state, and Florida well recognizes the key role that tourism plays in the state economy. Here we estimate that environment-related jobs in Florida total 220,000 – jobs that tend to be more highly skilled and better paying than those in the tourism sector. This fact is not widely known or appreciated by policy-makers in the state.

While designing such a development strategy is outside the scope of this report, there are concrete examples of environment-related initiatives that could create substantial numbers of jobs in Florida. For example:

- This study demonstrates that, at present in Florida, environmental protection is creating 220,000 jobs in the state, and these are disproportionately high-skilled, professional, scientific, technical, well paying jobs – many of them in manufacturing.

- A 2002 joint study by MISI and 20/20 Vision for the Energy Foundation estimated that an aggressive strengthening of U.S. Federal Corporate Average Fuel Economy (CAFE) standards would create more than 9,000 jobs in Florida. Thus, contrary to what many believe, the production of more fuel-efficient vehicles would create substantial numbers of jobs in Florida, not reduce them.[10]

- A 1999 study sponsored by the World Wildlife Fund and the Energy Foundation estimated that a strategy to address global warming in the U.S. would create more than 45,000 jobs in Florida.[11]

Given the multiplier effect of environmental spending and investment, it is likely that substantial numbers of jobs could be created through a systematic program to develop the environmental industry. Our findings show this is especially true in Florida, which currently has a thriving, job creating environmental industry, currently generating 220,000 jobs in the state, to a large extent unbeknownst to most state residents and probably to most policymakers. Such a systematic program of investment could have significant positive and potentially transformational impact. It is a matter of more fully linking classic economic development approaches with a better understanding of the role and reach of environmental programs and expenditures as a factor contributing to that development. This finding is consistent with the results derived for core manufacturing states such as Ohio, Minnesota, Wisconsin, and Michigan.[12]

[10]Management Information Services, Inc. and 20/20 Vision Education Fund, *Fuel Standards and Jobs: Economic, Employment, Energy, and Environmental Impacts of Revised CAFE Standards Through 2030*, Washington, D.C., 2002. See also Bezdek and Wendling "Potential Long-term Impacts of Changes in U.S. Vehicle Fuel Efficiency Standards," op. cit.

[11]Tellus Institute and Stockholm Environment Institute, *America's Global Warming Solutions*, Boston, August 1999.

[12]See www.misi-net.com for those reports.

VI. SUMMARY PROFILES OF SELECTED FLORIDA ENVIRONMENTAL COMPANIES

We conducted a survey of existing environmental companies in Florida, examining a functional, technological, and geographic mix of companies. Our research revealed a wide range of firms, and they:

- Are located throughout the state, in major urban centers, suburbs, small towns, and rural areas.
- Range in size from small firms of 12 employees to large firms employing thousands
- Are engaged a wide variety of activities, including engineering, remediation, testing, monitoring, analysis, etc.
- Include some of the most sophisticated, high-tech firms in the state

Summary descriptions of a representative sample of these firms are given in Table 7 and are discussed below. The information presented is current as of September 2004.

VI.A. American Compliance Technologies, Inc.

American Compliance Technologies, Inc. (ACT), located in Bartow, specializes in hazardous waste handling and management, 24-hour emergency response to chemical and petroleum spills, and chemical and petroleum contaminated site remediation. The company has 35 employees, all in Florida, and they consist of scientific personnel, remediation and response specialists, technicians, and support staff. ACT has hired three new employees in the past six months. The firm's business is about 75 percent industrial/commercial and 25 percent government, and all of its sales are domestic.

ACT was founded in 1987 in Lakeland and relocated to Bartow in 1995, and half of its staff is specifically trained to respond to chemical and petroleum spills. ACT recycles products and also ships materials such as concrete, metal, and asphalt to local companies for them to recycle. The company recently won the medium business category in Polk County's recycling awards program for the second time.

Table 7
Summary of the Select Florida Environmental Companies Profiled

Company	Location	Products/Services	Jobs
American Compliance Technologies, Inc.	Bartow	Waste disposal and site remediation	US: 35; FL: 35
Ayres Associates	Jacksonville, Sarasota, Tampa	Environmental, wastewater, and waste management	US: 400; FL: 75
Blasland, Bouck, and Lee, Inc.	Boca Rotan, Naples, Pensacola, Tallahassee, Tampa	Environmental consulting, health and safety services	US: 700; FL: 65
Biological Research Associates, Inc.	Destin, Panama City, Sarasota, Tallahassee, Vero Beach	Environmental permitting, planning, management, and consulting	US: 90; FL: 90
Environmental Consulting and Technology, Inc.	Gainesville, Ft. Myers, Ft. Lauderdale, Jacksonville, Melbourne, New Smyrna Beach, Orlando, Tallahassee, Tampa	Full service environmental consulting	US: 190; FL: 160
GeoSyntec Consultants	Tampa, Boca Rotan, Titusville, Jacksonville	Earth, environmental, geotechnical, and hydrological consulting, design, and planning	US: 450; FL: 80
Glatting Jackson	Orlando, West Pam Beach	Environmental services, planning, and design	US: 115; FL: 115
Lang Engineering & Environmental Services	Tampa, Jacksonville	Environmental, IAQ, and remediation services	US: 250; FL: 250
Malcolm Pirnie	Ft. Myers, Ft. Lauderdale, Miami, Orlando, Tampa,	Environmental engineering and consulting	US: 1,400; FL: 65
Marinco Bioassay Laboratory	Sarasota	Toxicity testing	US: 12; FL: 12
OHC	Tampa, Coca Beach, Jacksonville, Orlando, Palm Beach Gardens	Environmental and OHS consulting services	US: 42; FL: 42
Severn Trent Laboratories	Miami, Pensacola, Tallahassee, Tampa	Environmental testing	US: 2,200; FL: 200
WRS Infrastructure and Environment, Inc.	Tampa, Miami, Gainesville, Tallahassee,	Environmental remediation, construction, and emergency response	US: 250; FL: 140

Source: Management Information Services, Inc., 2004.

Spill work accounts for 25 percent of ACT's business, assessments of properties account for 25 percent, and remediation and disposal of hazardous materials account for 50 percent. The firm provides the following services nationwide on a 24x7 basis:

- *Remediation/site work/installation services.* Removal and disposal of contaminated soils, groundwater pump tests, horizontal recovery wells, groundwater treatment systems, (portable and installed), in-situ and ex-situ bio-remediation, landfarm cells, ion collider remediation technology, firing range, grading, compacting, and site restoration.

- *24 hour emergency response services.* Vacuum truck services, decontamination trailers, spill contingency plans, fuels, gases, mercury, biomedical, and chemicals response, and localized response centers throughout Florida.

- *Indoor air quality.* Audits, toxicology assessments, comprehensive analysis for IAQ compliance issues, duct system robotics viewing and video, duct system cleaning, sick building remediation, IAQ domestic preparedness building assessment, monthly monitoring, and radon testing.

- *Environmental construction.* Dewatering -- lakes, ponds, canals, excavations, build containment's, bemis, lined pits, weirs, remediation system installation and demolition, patented dewatering process for dredged lake sediments.

- *Industrial cleaning services.* Sumps, oil water separators, above ground and underground storage tanks, containment and process equipment decontamination, facility closure and decontamination, surface and structure, confined space entry cleaning, and decontamination.

- *Storage tank services.* Certified pollutant storage tank contract storage. Tank cleanings -- industrial, hazardous, non-hazardous, UST/AST removal, installation, replacement, retrofitting or upgrades, piping, tank closure and remediation services, and emergency generator package installations.

- *Personnel/equipment.* Licensed professionals, fully trained and certified field crews, equipment operators, pipe threaders, labor, heavy equipment, dump trucks, tanker, portable tanks, roll-offs, pumps, air strippers, bio-reactors, process equipment, and supplies.

- *Hazardous/non-hazardous waste handling.* Waste management plans, waste identification, characterization packaging, transportation, shipping, and disposal. Removal of bulk and drums, solids, sludges and liquids, lab packs, OSHA-trained and medically monitored personnel, "cradle to grave" documentation provided.

- *Liquid/solid waste services.* Permitted treatment facility with a 75,000 gpd capacity. Petroleum contaminated water, IDW, process wastewater, car/truck wash water, and liquids/solids separation, processing, and bulking.

ACT recently added a wastewater treatment facility to treat industrial wastewaters, and local companies can bring water to ACT that they cannot discharge of properly.

VI.B. Ayres Associates

Ayres Associates was founded in 1959 and has offices in Jacksonville, Sarasota, and Tampa. The firm has 400 employees, including 75 in Florida, and has hired 13 new employees in the past six months. The staff consists of engineers, technicians, and administrative and support staff. Its business is divided equally between public and private sector clients, and all of its clients are domestic.

Ayres provides engineering services in transportation, civil, structural, wastewater, river, and water resources disciplines and offers consulting in architecture, environmental science, surveying, photogrammetry, and geographic information systems. The firm's work includes the following areas:

- *Environmental:* Soil and ground water contamination investigation and remediation, industrial wastewater management, solid waste recycling and landfills, alternative wastewater collection and treatment, air emission permitting, environmental site assessments and management plans, petroleum storage tank management, brownfields, lead or asbestos investigations, and grant writing assistance.

- *Wastewater technologies:* Wastewater treatment facilities planning and design, wastewater flow reduction, reclamation, and reuse systems, applied research and development of low-cost wastewater collection and treatment alternatives, wastewater treatment process performance assessments, and environmental impact and water quality assessments.

- *Water resources:* Dams and flood control, river and coastal engineering, hydrologic and hydraulic studies, ground water hydrology and modeling, flood control and flood studies, geomorphic studies, storm water permitting and management, hydroelectric development and licensing, dam safety, cranberry services, floating bulkhead demonstration, and samwin (information on hydraulic design package for channels).

- *Photogrammetry:* Digital orthophotography, planimetric mapping, topographic mapping, digital elevation models, analytical aerotriangulation, geographic information systems, automated mapping/facilities management (am/fm), and aerial mosaics,

- *Survey:* Boundary surveys, construction staking, control surveys, gps surveys, hydrographic surveys, remonu-mentation, and site surveys.

- *Municipal engineering:* Municipal wastewater collection and treatment, municipal water supply, storage, treatment, and distribution, storm water drainage, municipal streets, business and industrial parks, land use and facility studies, and site development.

VI.C. Blasland, Bouck, and Lee, Inc.

Blasland, Bouck and Lee, Inc. (BBL) is a leading provider of environmental, health, and safety services in the United States and internationally, and has offices in Boca Rotan, Naples, Tampa, Tallahassee, and Pensacola. The firm has 700 employees nationwide, including 65 in Florida, and its staff consists of engineers, consultants, technologists, and support personnel. BBL's business is 80 percent industrial/commercial and 20 percent government, and its Florida offices' sales are almost entirely domestic.

BBL began with 12 employees and grew rapidly as industry began to increasingly focus on environmental issues. The company was able to position itself as a provider of high value services and currently has a diverse client base of Fortune 100 companies and large municipalities.

The firm has become a leader in the environmental consulting industry and has grown into one of the largest firms of its kind in the country. Since 1992, the firm has been ranked as one of the Top 100 design firms in the United States by *Engineering News-Record*, and it currently ranks 75th on the magazine's list.

BBL brings together professionals with experience from all corners of the globe. In addition to work in the U.S., its personnel have successfully completed work in Europe, Asia/Pacific Rim, North America, Latin America, South America, and Australia. BBL's services offered Include:

- Asset Evaluation
- Construction Related Services
- Environmental Economics and Environmental Business Consulting
- Environmental Health and Safety
- Hydrogeologic Services
- Life Sciences
- Litigation Support
- Operations, Maintenance, and Monitoring
- Planning
- Remedial Services
- Water and Wastewater Services
- Waterfront Services, including contaminated sediments and ports and harbors
- Watershed/TMDL Services

VI.D. Biological Research Associates, Inc.

Biological Research Associates (BRA) has offices in Destin, Panama City, Sarasota, Tallahassee, and Vero Beach and provides services in environmental permitting, wildlife and plant ecology, environmental land planning and management, wetland design, planting, maintenance, and monitoring. The firm was founded in 1975, has 90 employees (all in Florida), and has hired seven new employees in the past six months. Its staff consists of scientific, professional, and technical personnel and support staff. About half its sales are industrial and half are governmental, and about 90 percent of its business is domestic.

BRA provides large-scale, high profile projects and creative development of solutions that minimize environmental impacts and increase profits. The firm is well known for its environmental support for planners, governmental agencies, engineers, transportation specialists and developers. BRA has effective rapport with agencies and has received numerous awards for its services.

BRA's services include:

- *Constraint Analyses.* Due-diligence assessments of aquatic and terrestrial ecosystems.

- *Environmental Stewardship and Conservation Planning and Ecosystem Management.* The firm assists in environmental land planning and design management plans for water management districts, counties, water suppliers, developers, and large private landowners.

- *Environmental Assessment and Monitoring.* BRA has provided environmental assessment and monitoring services to public and private clients for over 25 years.

- *Environmental Permitting*. BRA provides alternatives analyses, avoidance and minimization review, mitigation planning, permit application package preparation, and strong negotiating skills.

- *GIS.* The company is a full featured GIS service provider specializing in development of effective and appropriate solutions for clients.

- *Jurisdictional Delineation*. BRA represents clients needing wetland delineations for federal, state, or local wetlands permitting. Its delineators include former agency permitters, scientists trained in delineation methodologies, and scientists who participated in establishment and/or review of delineation methodologies.

- *Lake Management.* BRA's experts analyze existing conditions of lakes to prepare appropriate management programs, they correct weed and water quality problems, and provide guidance to minimize future maintenance needs.

- *Mitigation: Creation, Restoration, and Maintenance*. The firm provides a full range of mitigation services from wetland design to maintenance and monitoring and can handle large and small projects, many of which are focal points in commercial and residential areas.

- *Permit Compliance Services*. BRA can help bridge the gap between permit and construction.

- *Water Resources*. Monitoring and evaluation of surface water quality, design of treatment wetlands, and aquatic habitat assessments are among the services BRA provides. BRA also provides sampling, data analysis, and computer modeling.

- *Water Use Permitting*. The firm has a long history of providing water use services to public and private clients, including public water suppliers, industries, and agricultural water users. Services range from planning suitable locations for portable water wellfields and agricultural wells to permit compliance monitoring and assistance in obtaining or renewing water use permits.

- *Wildlife Services*. The firm utilizes science and ecology to assist clients balance the needs of humanity with the needs of wildlife.

VI.E. Environmental Consulting and Technology, Inc.

Environmental Consulting and Technology, Inc. (ECT) is an employee-owned, multidisciplinary environmental consulting firm offering a broad range of planning, management, scientific, and engineering services. It is headquartered in Gainesville and has offices in Ft. Lauderdale, Ft. Myers, Jacksonville, Melbourne, New Smyrna Beach, Orlando, Tallahassee, and Tampa. It has 190 employees, including 160 in Florida. It staff consists of scientists, engineers, hygienists, hydrologists, geologists, oceanographers, ecologists, and support personnel, and the firm has hired ten new employees in the past six months. About 80 percent of its business is industrial and about 20 percent is government; most of its sales are domestic.

ECT was founded in 1988 with offices in Gainesville and Tampa. During the 1990s, ECT subsequently branched out by opening additional offices in Florida and in several other states. The firm's professional scientists and engineers have a proven record of success in meeting the service needs of private industry and public sector clients. ECT specializes in the resolution of complex environmental issues through cost-effective project planning, management, and applied engineering and scientific expertise. Its professionals listen to clients' specific needs and develop a sound technical understanding of these needs prior to designing solutions. Responsive communications and accountability are key to every project performed by ECT. The firm's specialties include the following:

- *Air Resources*. ECT's air resources staff help industry meet ongoing CAA compliance challenges by providing comprehensive knowledge and the understanding of ever-changing regulations, and its capabilities include compliance assistance and emission source permitting.

- *Remediation*. ECT's assessment and remediation services are tailored to efficiently define the extent of soil and groundwater contamination and, as necessary, design and implement a contaminant recovery/treatment system or other remedial solution.

- *Engineering Services*. ECT's registered professional engineers and support staff provide engineering services for a complete range of environmental projects. Areas of engineering expertise include air pollution, water resources, wastewater treatment, water supply and treatment, solid and hazardous waste management, site remediation, and surface water management.

- *Environmental Health and Safety Services*. ECT identifies and evaluates physical, chemical, and biological hazards in the work place and devises ways to control or eliminate them. Under the direction of ECT's board certified industrial hygienists and asbestos consultants, ECT provides a variety of environmental, health, safety, and industrial hygiene services.

- *Site Selection and Environmental Assessments*. The firm provides a complete range of environmental and risk management services to assist potential site owners, investors, developers, and sellers of real estate. ECT can pinpoint site-specific liabilities and developmental constraints and provide ongoing support to mitigation planning efforts or other site selection components.

- *Facility Planning, Siting, and Licensing*. ECT's multidisciplinary teams have successfully participated in the planning, siting, and licensing of a diverse array of projects including power plants and electrical transmission lines, chemical plants, phosphate mines, hospital complexes, solid waste incinerators, and natural gas pipelines.

- *Ecology*. Company staff ecologists and supporting environmental professionals provide comprehensive field assessment and mapping services to expedite the preparation of wetlands and other ecological-related permit applications and their processing through the regulatory maze.

- *Water Resources*. ECT's water resources staff include professional engineers, hydrologists, geologists, and oceanographers providing services and expertise related to the marine, lacustrine, estuarine, fluvial, and hydrogeological environments. ECT provides a full range of consulting services within water resources.

- *ISO 1400*. ECT leads the industry in implementing ISO 14001 and related environmental procedures and has provided thousands of hours of implementation support to facilities worldwide -- all of them successfully obtaining ISO 14001 registration.

VI.F. GeoSyntec Consultants

GeoSyntec is an employee-owned environmental sciences consulting, engineering, and design company founded in 1983 and has offices in Tampa, Boca Rotan, Titusville, and Jacksonville. Its employees consist of engineers, scientists, technical specialists, and administrative and support staff, and it has 450 employees nationwide and 80 in Florida. Its clientele is 75 percent industrial and 25 percent government, and about 90 percent of its sales are domestic.

GeoSyntec provides clients with earth and environmental sciences consulting services; environmental, geotechnical, and hydrological engineering consulting and design services; and construction management and quality assurance services for projects involving these practices. The company philosophy is that all professionals, including principals, maintain their focus on their professional practice and client relationships. The firm has grown around projects involving environmental studies and restoration, natural resources management, and engineering and design for the solid waste disposal, water resources, and transportation infrastructures. GeoSyntec is nationally known for its leadership, broad experience, technological innovation, and exceptional client service.

GeoSyntec's professionals continue to develop new technology applications and practice capabilities. Their applied research partnerships with leading universities, NASA, and others are producing better methods for the remediation of recalcitrant chemicals in the environment; management of urban watersheds to reduce pollutant loadings; protection of endangered species from the impacts of storm water runoff; design and construction of industrial and municipal waste disposal facilities; and geotechnical analysis and design of transportation facilities. The company's goals are to provide the best possible service and value to clients, to advance technology in the primary practice areas, and to provide a stimulating, progressive, and friendly work environment that will facilitate recruitment and retention of qualified staff.

GeoSyntec applies its expertise to projects involving environmental restoration and operations, natural resources management, and the solid waste, transportation, and water resources infrastructure, and its major project areas include:

- Groundwater Assessment and Remediation
- Vapor Intrusion, Indoor Air Quality, and Vapor Control Services
- Surface Water and Natural Resources Management
- Site Investigation and Remedial Design/Action
- Geoenvironmental Engineering
- Geotechnical Engineering
- Environmental Management
- Pollution Prevention
- Risk Assessment and Management
- Brownfield Site Development
- Waste Disposal Facility Permitting, Design, Construction and Closure

VI.G. Glatting Jackson

Glatting Jackson Kercher Anglin Lopez Rinehart, Inc. was founded in 1974 and has offices in Orlando and West Palm Beach. It specializes in environmental services and planning, transportation planning, parks and open space planning, landscape architecture, and urban design. The firm has 114 employees, 111 of them in Florida, and has hired 19 new staff over the past six months. The staff includes landscape architects, urban and transportation planners, engineers, technicians, and support personnel. About 60 percent of its clients are private industry and 40 percent are governmental; 90 percent of its business is domestic.

The firm has successfully merged its specialties into a single Community Planning process. Whatever the scale of work, from small residential communities to regional transportation systems, Glatting Jackson strives to make a difference, to make life better than it was before. Services provided include:

- *Planning*. Glatting Jackson has demonstrated success in private and public land planning by guiding major developers, corporations, institutions, and public agencies in the design, creation and construction of mixed-use communities, office centers, golf course and traditional residential villages and communities, recreational parks and open space, national and international theme parks,

leisure resorts, urban redevelopment, commercial projects and regional visions and implementation strategies.

- *Landscape Architecture*. Through its planning and landscape design services, the firm excels in creating interesting people-oriented places. Staff design complete communities by combining landscape design with environmental and transportation system design. Glatting Jackson has created unique landscape designs and urban designs for a variety of public and private projects, including residential and golf course communities, themed resorts, mixed-use centers, office, light industrial and commercial developments, schools, downtown redevelopment programs, expressway and multi-modal corridors, and public parks.

- *Urban Design*. Glatting Jackson provides urban design services to local governments and institutions and private investors as they develop properties and infrastructure that affect the public realm. The mission is to help clients create interesting places that grow in value; sustainable places and neighborhoods that serve present and future generations. The urban design practice includes a specialty in transportation facilities and multi-modal corridors that fully integrates transportation planning and urban design. The results are livable communities served by well-developed transportation systems.

- *Transportation Planning*. Glatting Jackson is a national leader in transportation planning. It has developed a national transportation-planning practice recognized for its ability to work within a context-sensitive process that assists both public and private clients in understanding how the local context should guide the planning, design, and implementation of all transportation initiatives. The firm's transportation team is multi-disciplinary and provides a wide range of transportation services to federal, state, and local agencies as well as the private development community, and non-governmental organizations.

VI.H. Lang Engineering and Environmental Services

Lang Engineering and Environmental Services (LEI) has offices in Tampa Jacksonville and provides engineering and environmental services throughout the Southeast United States. It has 250 employees, all in Florida, and has hired ten new staff over the past six months. Staff consist of engineers, technicians, and administrative and support personnel. About half of its clients are industrial and half are governmental, and all of its sales are domestic.

LEI has been building a reputation for providing superior remediation services throughout the southeastern U.S. since 1987. Over the past 17 years, it has successfully completed over 3,000 abatement and remediation projects, with total revenues approaching $100 million. YODER Construction, a division of LEI, has completed projects in many Tampa area hospitals and healthcare facilities, and has recently developed the Eichenfeld Medical Center property in Brandon, Florida. Over 80 percent of LEI's business is based on long term contracts and repeat business, where the primary focus is to identify what the client wants and deliver it. Environmental services provided include:

- *Indoor Air Quality*. While indoor environmental quality involves the removal of dust from ductwork, Lang Environmental does much more than just "duct cleaning." LEI also removes any microbial contamination found in the ductwork, which the EPA has recently cited as the most common cause of Building Related Illness.

- *Asbestos and Lead Abatement*. LEI has been building a reputation as a highly qualified asbestos and lead abatement contractor, and over 80 percent of its business is based on long term contracts and relationships. The projects performed involve the removal and disposal of all material according to OSHA and EPA standards.

- *Hazardous Material Remediation*. LEI has performed hazardous material remediation in the form of decontamination, removal, treatment, disposal, and demolition. Its primary niche in this service area is Superfund Site clean up.

VI.I. Malcolm Pirnie

Malcolm Pirnie is one of the largest firms in the U.S. focused on environmental issues, and for over a century has provided environmental engineering, science, and consulting services to 3,000 public and private clients. Of its 1,400 employees, 65 work out of its offices in Ft. Myers, Ft. Lauderdale, Miami, Orlando, and Tampa, and it has added six new jobs in Florida over the past six months. The firm’s employees are primarily engineering/technical, and its business is about 60 percent government/public sector and 40 percent private – commercial and industrial. About five percent of its sales are international.

Malcolm Pirnie has built its practice and reputation on technical excellence and innovation, and its staff of engineers, scientists, consultants, designers, architects, and technical support personnel are located in more than 40 offices nationwide. More than 100 Pirnie projects over the last ten years have been recognized for engineering excellence in competitions nationwide, and the firm is a recognized source in developing environmental policy, management, and technology.

Malcolm Pirnie was founded in 1895 as consulting practice in Boston to solve "problems in water supply, sewerage and sewage disposal." The firm's reputation grew as early projects helped define where the emerging environmental profession was headed. New technologies such as rapid sand filtration and disinfection were perfected as the firm developed drinking water supplies for new Florida resorts and engineered water treatment plants and reservoirs along the Eastern seaboard. After various transitions in partners and management, the firm evolved to become Malcolm Pirnie Civil Engineer in 1930. By 1940, the firm had a staff of 25 devoted almost exclusively to Army and Navy work and defense projects across the country and in Puerto Rico, developing the high-purity oxygen concept to heighten effectiveness of aerobic wastewater treatment.

Spurred by the first federal environmental law passed in 1948, Malcolm Pirnie's water process experts continued to engineer drinking water facilities for America's cities. They expanded their focus from producing biologically safe water using filtration to concern about its chemical constituents, and revolutionized large-plant design by applying new high-rate technologies.

During the 1960s and 1970s, having developed expertise in large sewage treatment facilities, the firm designed innovative nitrification plants for New York State's Capital District that initiated the cleanup of the badly polluted Hudson River. Malcolm Pirnie engineered challenging environmental facilities overseas and designed improved processes to treat complex industrial wastes. With the 1970s, the first Earth Day signaled a new environmental era, and Pirnie's services were in demand for major projects in cities all across the country, including Cleveland and Cincinnati. New technologies and disciplines were added, expanding the firm's capabilities from engineering to environmental sciences and planning. In the 1980s, Superfund hazardous waste investigations and cleanups from Love Canal to Marathon Battery were a major focus for the firm, while a new array of drinking water quality issues related to organic contamination drove innovative project designs. The firm expanded into environmentally sound, state-of-the-art solid waste management and air quality solutions, and into new issues such as odor control and air toxics. Pirnie's engineers and scientists continue to evaluate and apply new technologies designed to safeguard public health and the environment.

Malcolm Pirnie is a closely-held "S" corporation with headquarters in White Plains New York. All shares are owned by full-time employees who are also officers or senior managers of the firm. The firm’s annual revenues exceed $200 million and it is ranked by the *Engineering News Record* among the top 25 U.S. firms in many environmental areas, including environmental science, water treatment and desalination, sewerage and solid waste, wastewater treatment, hazardous waste, chemical and soil remediation, and site assessment and compliance.

VI.J. Marinco Bioassay Laboratory

Marinco Bioassay Laboratory, Inc. (MBL) is a NELAP/C accredited toxicity testing laboratory located in Sarasota. It has 12 employees, all in Florida, and its staff consists primarily of scientists and technicians. About 75 percent of its clientele is in the public sector and about 25 percent is in industry; all of its business is domestic.

MBL's QA/QC program is one of the most stringent in the industry; one that extends end to end, from the culture of the test organisms to the delivery of the final reports. Since its inception in 1988, MBL has grown into one of the largest toxicity testing laboratories in the Southeast and an industry leader. The company's 5,600 sq. ft. facility in Sarasota is also home to its state of the art aquaculture program. MBL was the first and is still the only Florida WET lab to culture all of its test organisms in-house, and it is also the only company to maintain both low-salinity (9 ppt) and standard (20 ppt) Mysid cultures.

MBL's facilities include multiple walk-in, electronically-controlled environmental chambers, water-baths, and a commercial refrigerator for sample storage. The staff utilizes modern HACH, Mettler, and Orion instrumentation, and receives comprehensive training on the implementation of Standard Operating Procedures, in accordance with NELAC standards and EPA test protocols. The firm’s toxicity testing services include:

- Acute and chronic tests for NPDES discharge permits
- Toxicity Identification Evaluations
- Toxicity Reduction Evaluations
- Chemical Product Testing
- LC50, IC25, and NOEC Determinations
- Reverse Osmosis Reject Water Toxicity Testing
- Ion Imbalance Toxicity Evaluations
- Consulting on Toxicity Issues
- New Permit Review

VI.K. OHC Environmental Engineering

OHC is a leading Florida-based corporation providing comprehensive occupational health and environmental consulting services in the Southeastern United States and the Caribbean. Established in 1983 in Tampa, OHC has since added

offices in Cocoa Beach, Jacksonville, Orlando, and West Palm Beach. It has 42 employees, all in Florida, including engineers, scientists, technicians, and industrial hygienists.

OHC has never received a citation from OSHA, the Florida DEP, or U.S. EPA, or been involved in any litigation regarding its professional practice. The firm's capabilities include:

- *Environmental Engineering*: Risk management planning, site contamination assessment and remediation, Phase I site assessments, Phase II investigation, Phase III remediation design and management, UST/AST assessment, remediation and closure, hazardous materials clean-up/disposal, remedial action plan design and approval, remediation management, permitting and licensing, hazardous waste control and minimization, radon testing, and wetland surveys

- *Industrial Hygiene*: OSHA compliance, exposure assessment, exposure control, hearing conservation programs, respiratory protection programs, health and safety audits, and ergonomics

- *Laboratory Services*: In-house NVLAP accredited, polarized light microscopy, phase contrast microscopy, transmission electron microscopy, and in-house lead analysis

- *Lead Consulting*: Paint/water/soil testing, air monitoring/ supervision and management, laboratory analysis, remediation design, and project management/supervision

- *Process Engineering*: Simulation, optimization, and dispersion modeling

- *Asbestos*: Facility surveys and assessment, remediation design, operations and maintenance, air monitoring/ supervision and management, laboratory analysis, response action designs, contract administration, final job inspections/ clearance, and expert witness testimony.

- *On-site Training*: Hazmat/hazpower, employee right-to-know programs, state-accredited asbestos courses, lead abatement, and handling IAQ concerns

- *Indoor Air Quality*: Sick building syndrome assessment and resolution, building surveys, HVAC evaluation, emissions and ambient air monitoring, and public relations.

- *Radon Testing*: Phase I, II, and III

VI.L. Servern Trent Laboratories

Severn Trent Laboratories (STL) has offices in Miami, Pensacola, Tallahassee, and Tampa and is one of the leading environmental testing companies in the world. It has 2,200 employees nationwide, including 200 in Florida, and has hired 20 new staff over the past six months. The firm's employees include chemists, microbiologists, environmental scientists, and administrative and support personnel, and all of its Florida work is domestic.

Focusing upon the world's environmental testing concerns, STL has developed a passion for being the best in the business. In response to the firm's client service philosophy, the reliability of its data, the technical knowledge of its staff, and its leadership stance on quality and ethics, STL is increasingly being recognized as the leading provider of environmental testing services throughout the industry.

Through continued investment in facilities, equipment, methods, and people, STL has developed an unprecedented team of resources, experience and capabilities. It is well positioned to support a variety of clients including government departments such as the Department of Defense and Department of Energy and commercial organizations operating in various sectors of industry, including environmental consultancy, engineering, waste management, power and energy, transportation, oil and petroleum, water treatment, and manufacturing.

STL's operations include environmental testing laboratories, service centers, and QED Environmental Systems -- the leading supplier of pumping systems, equipment used for groundwater sampling, and low-flow purging and sampling methodology systems such as Well Wizard™. The firm's testing capabilities include chemical, physical, and biological analyses of a variety of matrices, including aqueous, solid, drinking water, waste, tissue, air, and saline/estuarine samples. Specialty capabilities include air toxics testing, mixed waste testing, tissue preparation and analysis, aquatic toxicology, dioxin/furan testing, and microscopy.

VI.M. WRS Infrastructure and Environment, Inc.

WRS Infrastructure and Environment, Inc. (WRS) has its corporate headquarters in Tampa and offices in Tallahassee, Miami, and Gainesville, and it provides environmental and technical services to selected long-term public and private sector customers in targeted geographical areas of the United States. The firm has 250 employees, including 140 in Florida, and has hired 30 new staff over the past six months. Its employees include scientists, engineers, environmental specialists, degreed technologists, and administrative and support staff. About 90 percent of its

business is with public sector clients and 10 percent is with the private sector; virtually all of its clients are domestic.

The firm's history dates back to 1987, when Westinghouse acquired Soil and Materials Engineering, Inc. and consolidated its resources with the existing environmental groups within Westinghouse. From 1987 through 1996, WRS evolved through several corporate structures while developing a strong position in the environmental and technical services markets. In 1997, a team of WRS management and River Associates, LLC acquired this unit from Westinghouse and the company has operated as a private Corporation since that time. In 2003, Equity Group Investments, L.L.C., replaced River Associates, L.L.C. as majority equity partner in WRS.

WRS services include information technology services, remediation services, technical/engineering services, and environmental permitting and compliance. The major sectors the firm serves include:

- *Federal Government*. WRS has been addressing the complexities of environmental cleanups faced by Federal agencies and their clients for two decades. It has implemented innovative yet practical solutions to a wide range of issues for federal clients while working in partnership with federal, state, and local regulators. The firm has executed environmental investigation, restoration, remediation, and operations and monitoring services for DOD, EPA, and other Federal clients.

- *State and Local Government*. WRS has worked as a partner with the full spectrum of public governments, from small communities, to large metropolitan areas, to state governments across the country. In each case, it has brought the same approach -- innovative solutions developed through strong client relationships of mutual trust and respect and a commitment to quality and integrity.

- *Transportation*. As a full-service environmental contractor, WRS has performed all activities essential to assessment, engineering, design, and environmental remediation. The firm offers significantly more to the transportation industry than the "standard" environmental services. WRS replaces paving systems, installs underground utilities and foundations, designs and builds fuel facilities, and performs all other civil construction related to building transportation facilities. WRS offers the unique and valuable capability to plan and perform roadwork and civil construction associated with transportation structures while at the same time addressing environmental concerns.

- *Private Industry*. WRS is experienced in addressing the complexities of environmental cleanups faced by private industry and has implemented innovative yet practical solutions to a wide range of problems for industrial clients in the oil and gas, utility, manufacturing, and chemical industries for two decades.

VII. OPPORTUNITIES IN FLORIDA STATE GOVERNMENT PROGRAMS FOR ENCOURAGING ENVIRONMENT-RELATED JOBS

VII.A. Governor's Council of Economic Advisors

The Council of Economic Advisors (CEA) was created through Executive Order 02-317 in 2000 to advise the Governor on the latest economic trends, how Florida is faring nationally, and ways to continue to grow the state's economy. The council studies the impact of local, national and global economic forces in Florida and assists the Governor, his administration, and elected state officials in the formulation of sound economic policies and in creating economic opportunities for all of the state's citizens. In creating the CEA, Governor Bush stated "It is in the best interest of the state to have a sound economic development strategy that considers local, national and global economic forces. By creating the Council of Economic Advisors, the state will now have a sound economic development strategy to guide Florida towards a world-class business climate and prosperous future." The CEA is composed of 11 members appointed by the Governor.

The Council played a strategic role in the post-September 11, 2001 response effort by recommending to the Governor how to rapidly improve the state's economy following the terror attacks. Among their recommendations, the Council emphasized no new taxes, fiscal discipline, expeditious investment in job creation industries, and diversification of the economy. Since then, Florida has been on an impressive trend in creating new jobs – as contrasted with most other states.

The Florida CEA could be an appropriate entity to raise jobs and the environment issues at the level of the governor and senior state officials, although this has thus far not been its focus. Nevertheless, integrating these issues into the state's portfolio of economic, industry, and job development programs and initiatives fits in well with the Council's mandate to develop a "sound economic development strategy to guide Florida towards a world-class business climate and prosperous future" and its efforts to facilitate investment in job creation industries and to diversify the state economy.

VII.B. Florida Department of Environmental Protection

The Florida Department of Environmental Protection, (FDEP) is the lead agency in state government for environmental management and stewardship. The department administers regulatory programs and issues permits for air, water, and waste management. It oversees the state's land and water conservation program, Florida Forever, and manages the nationally award-winning Florida Park Service. The department is the main architect of the $7.8 billion funding and management plan to restore America's Everglades – the largest water restoration project in the history of the world.

In 1993, the Florida Legislature merged the Department of Environmental Regulation with the Department of Natural Resources to form the Department of Environmental Protection. The Florida Department of Environmental Protection is one of 15 state government agencies under the executive branch of the Governor. The agency has 3,000 full-time employees working in its capital offices, two state-of-the-art laboratories, and six regional offices.

FDEP currently has no office or division dealing with jobs and the environment issues. However, such an office or division could be established within FDEP – perhaps in the Office of Strategic Projects and Planning.

VII.C. Office of Strategic Projects and Planning

The FDEP Office of Strategic Projects and Planning (OSPP) has three primary sets of activities:

- Participating in the management and direction of the Department's information management, particularly the Integrated Management Information System

- Supporting the Department's strategic planning functions, including performance measurement, priority setting, monitoring, and participating in Federal and association planning and reporting activities

- Special projects in support of Departmental initiatives and projects, such as supporting the state's energy initiatives, applying for and managing federal grants, supporting the annual Compliance and Enforcement workshop, and administering the Personnel Exchange Program with EPA Region IV

One OSPP initiative being undertaken is the Hybrid Vehicles for Florida Government. Gasoline-electric hybrid vehicles are superior to conventional vehicles in both improved fuel efficiency and reduced air emissions. OSPP is providing outreach to other state agencies and county and municipal governments, encouraging each to adopt a “hybrid-first” purchase policy in which hybrid vehicles are the preferred purchase option.

VII.D. Florida Energy Office

The Florida Energy Office (FEO) is a unit of the Department of Environmental Protection that serves as the central place in state government for information on energy related issues in Florida. It is the state entity responsible for performing or coordinating the functions of federal energy programs delegated to the state, including energy supply, demand, conservation, and allocation, and is responsible for developing

and coordinating implementation of energy policy within the state. The FEO also coordinates the efforts to seek federal support or other support for state energy activities, including energy conservation, energy efficiency, research, development, deployment, and commercialization of next generation technologies. Through the FEO, the State of Florida accomplishes its commitment to programs concerned with energy and hydrogen.

These programs and subsequent actions will help shape Florida's energy future. Through the FEO, the state will lead by example, diversify the economy, streamline and modernize government regulations and provide assistance to both communities and needy families. Several illustrative FEO initiatives are summarized below.

VII.D.1. Front Porch Florida/Front Porch Sunshine

The Florida Energy Office, Florida Solar Energy Center, and Florida Solar Energy Research and Education Foundation established a partnership with Front Porch Florida, a program launched by Governor Bush in 1999 to revitalize low-income neighborhoods, to improve the energy efficiency of homes in designated communities throughout the state. State agencies are assisting 20 designated neighborhoods with community-driven initiatives for economic growth, education, and environmental preservation.

As part of this initiative, the state is implementing the Front Porch Sunshine project, which is providing 150 solar water heaters to residents in underserved communities throughout the state. Florida was the first state to install solar energy technology in weatherized, low-income homes. Department of Community Affairs Secretary Thaddeus Cohen stated that "The solar water heater program is a perfect compliment to the Front Porch Florida Initiative. These dynamic neighborhoods are continuing their legacy of promoting economic revitalization and community education while embracing this environmentally friendly technology. This initiative required successful collaboration between the Department of Community Affairs, Department of Environmental Protection, the Florida Solar Energy Research and Education Foundation, and community partners."

VII.D.2. SunSmart Schools Program

Florida's SunSmart Schools Program is installing 29 solar electric systems in schools throughout the state. It is funded by the Florida Energy Office and managed by the Florida Solar Energy Center, which is providing the engineering design for system installations and inspections. The program combines state funding with private partnerships to provide clean energy and science education. Over 115,000 watts of electricity are now being generated by solar power in Florida's schools, and the electric power generated by the system is being used to power the school's classrooms, with excess energy returned to the local power grid. The systems also provide on-site

classrooms for students to learn more about solar power and the benefits of energy conservation.

Our review of the FEO's work over the past decade indicates that there have been few projects supported that dealt specifically with jobs and the environment issues; however, the office does have the authority and resources to conduct such work. Another potential contribution the FEO could make would be to convene a congress on jobs and renewable energy/environment issues in Florida. It has sponsored a variety of sustainable development initiatives, and the time may thus be opportune to convene such a congress.

VII.E. Strategic Plan for Economic Development

Florida has a clear vision of the future and has developed a strategic plan to meet future goals and challenges. In Florida, it is a continuous improvement and grassroots process to develop strategies for continued economic growth and global competitiveness. Florida is known for public-private collaboration, and business, economic development, and government leaders are committed to working together in partnership to turn Florida's vision into reality. Florida understands that the global business community has important considerations beyond yesterday's bottom line and that the knowledge-driven companies that will dominate in the 21st century look at the big picture, over the long haul. They have raised the prominence of a number of issues related to quality of life, integration of world markets, social considerations, and the attitudes of both government and the general public toward businesses, and they have raised the bar for a supportive business climate that is on the leading edge. Florida seeks to monitor and assess customer needs, pricing, product improvement, and value comparisons in order to maintain and increase its competitiveness, and has developed collaborative partnerships with business, economic development organizations and government leaders to shape the state's future. The major goal is to maintain and increase Florida's competitive position.

Florida's *Strategic Plan for Economic Development, 2004-09: Diversifying Florida's Economy* is designed to diversify Florida's economy. Its vision is to develop the state into a global leader in knowledge-based jobs, leading-edge technology, and competitive enterprises in the 21st century, and its major goals are attracting and retaining globally competitive businesses, providing well paying jobs for Floridians, and ensuring a high quality of life throughout Florida.

The plan found that diversifying the state's economy is central to Florida's global competitiveness, and diversification requires raising the "quality" of economic growth and achieving multiple engines of growth in high wage, high productivity (value-added) clusters. The strategic planning process unearthed a wealth of "bright ideas" and best practices, and several were highlighted as priority recommendations to accelerate high value-added economic growth. These include:

- Establish Florida as a leading state for entrepreneurship, innovation and venture capital with a continued commitment to University Centers of Excellence and strategies for seed and venture capital.

- Ensure excellence in education and workforce for Florida's global competitiveness.

- Ensure the competitiveness of Florida's business climate with targeted incentives.

- Design and implement a market-driven stimulus strategy for Rural Areas of Critical Economic Concern.

- Retain and strengthen Florida's base in threatened industries.

- Transition growth management to a more flexible and comprehensive planning mindset for "smart growth."

- Invest in economic development at a competitive level and with innovative strategies.

- Streamline workforce initiatives and incentives.

- Transition from growth management to integrated comprehensive planning, incorporating land stewardship, density, schools, affordable/workforce housing, land use, environment, and water (water quality and water management).

The plan contains several observations and recommendations concerning the environment, quality of life, and tourism:

- Transition should be made from growth management to integrated comprehensive planning incorporating land stewardship, density, schools, affordable/workforce housing, land use, environment, and water (water quality and water management).

- Florida's market share for global tourism, trade, investment, and cultural exchange should be expanded and diversified. Florida is a leading international state and ranks first in international tourism, and the state's international strategy should leverage international tourism, trade, investment, education, and cultural exchange in high impact initiatives.

- Tourism marketing assistance to rural areas should be continued and Florida should develop a strategy for nature and heritage based tourism for areas of critical economic concern.

- Growth management regulations should be reviewed to remove barriers for rural economic development while simultaneously providing stewardship of natural assets and Florida's environmental quality of life.

- Florida should establish a Comprehensive Smart Growth Policy for Sustainable Economic Development, Diversification, and Quality of Life. Florida's growth management system should be updated and modified to encourage the best use of integrated planning for land, environmental protection, infrastructure, water supply, water quality, historical preservation, libraries, cultural arts, and other quality of life factors.

- Floridians should be educated on the integral link between historic preservation, culture, arts, land use and the environment, tourism and economic development. "Smart growth," which balances quality of life, environmental stewardship, value-added economic growth, and flexible government, has never been more critical for Florida's future.

- Qualify of life issues such as environmental protection and infrastructure should be integrated into a smart growth policy for economic diversification.

However, thus far, environment-related industries have not been a major priority emphasized under the state's strategic plan, and this is an oversight that should be remedied. The environmental industry and the jobs it creates adhere well to the objectives of the plan, and such an emphasis could:

- Help develop Florida into a global leader in knowledge-based jobs, leading-edge technology, and competitive enterprises

- Attract and retain globally competitive businesses, providing well paying jobs for Floridians

- Ensure a high quality of life throughout the state

- Diversify Florida's economy and help it achieve global competitiveness

- Raise the "quality" of economic growth and achieve multiple engines of growth in high wage, high productivity clusters.

- Establish Florida as a leading state for entrepreneurship, innovation, and venture capital

- Retain and strengthen Florida's base in threatened industries

VII.F. Florida Hydrogen Initiatives and Incentives

Florida has identified hydrogen development as a top priority and has established a number of hydrogen initiatives. Several of these are summarized below.

VII.F.1. The Florida Hydrogen Initiative, Inc.

The Florida Hydrogen Initiative, Inc. (FHI) is a 501(c)(3) non-profit organization created to administer a $2 million U.S. Department of Energy grant. The primary objective of FHI is to push Florida into the forefront of the hydrogen economy by investing in hydrogen infrastructure, supporting demonstration projects, and providing public education. To coordinate the activities of FHI with the Governor's energy strategy, FDEP Office of Strategic Projects and Planning staff serve as chair of the board of directors.

VII.F.2. The Hydrogen Business Partnership

The Hydrogen Business Partnership was formed between hydrogen technology developers, fuel and power producers, and major energy consumers to assist the state with a business plan for Florida's hydrogen future. The Partnership is recommending government and industry approaches to accelerate the development, demonstration, and commercialization of hydrogen technology.

VII.F.3. The Florida Hydrogen Business Council

FDEP created the Florida Hydrogen Business Council, a working group of hydrogen-related energy companies, to:

- Evaluate Florida's business climate for advanced hydrogen energy technology

- Demonstrate the viability of hydrogen technology, including hydrogen fuel cells, hydrogen-fueled internal combustion engines, hydrogen storage devices, and hydrogen fueling systems

- Explore paths to accelerate the demonstration and commercialization of hydrogen technologies, identifying and removing potential barriers

- Provide recommendations to accelerate economic development for the advanced energy technology sector in Florida

OSPP coordinates the staffing requirements for the council.

VII.F.4. The Hydrogen and Fuel Cells Summit

Each year, the Hydrogen and Fuel Cells Summit brings together an international audience of governments and private industries to exchange information and organizational support in developing performance, installation, and operation standards for hydrogen and fuel cell technologies. At the 2004 summit, DEP Deputy Secretary for Regulatory Programs and Energy Allan Bedwell stated that "Hydrogen energy has the potential to revolutionize the way we power our nation, offering cleaner, more-efficient alternatives to fossil fuels. Our investment in pollution-free technology benefits Florida's environment, quality of life, and economy."

VII.F.5. Hydrogen Demonstration Programs

To establish itself as a leader in hydrogen energy technology, Florida is exploring hydrogen as a pollution free source of energy in neighborhoods, public transportation, and at airports. Hydrogen powered cars will join the fleet at Wekiwa Springs State Park and fuel cells are being installed at a state park, a high school, and a wildlife refuge.

VII.F.6. State Hydrogen Industry Incentives

To meet the energy demands of a growing population and economy, Florida is recruiting hydrogen technology companies by providing risk capital for select projects and offering a non-regulatory environment for hydrogen demonstration projects. The state has approved the designation of the hydrogen energy industry as a Qualified Target Industry (QTI). This designation provides financial incentives for businesses to invest in Florida's hydrogen economy. Administered through the Governor's Office of Tourism, Trade, and Economic Development, QTI incentives are available to companies that create high wage jobs in targeted industries. Tax incentives include refunds on corporate income, sales, and ad valorem taxes. Valuable for attracting businesses and furthering advanced technology, targeted industries help strengthen and diversify Florida's economy and workforce. Designation of the hydrogen energy industry as a QTI is also an investment in Florida's air quality. Hydrogen fuel cells are pollution-free, powering cars, homes, and businesses by combining hydrogen and oxygen to produce electricity -- emitting only steam.

According to FDEP Deputy Secretary for Regulatory Programs and Energy Allan Bedwell "This designation further supports Florida's investment in 'next generation' clean energy technology. Providing a strong business climate for hydrogen technology brings environmental and economic benefits to the State of Florida. Florida's leadership

in the development of hydrogen technology will protect the environment and bring new investment, companies, and jobs to the State."

The Florida hydrogen incentives programs represent excellent vehicles for bringing jobs and the environment issues to the forefront in the state:

- They are new, high priority statutory state programs.
- They leverage unique state resources and expertise.
- They have the express goal of creating high-tech renewable energy jobs and businesses.
- They are amply funded.

VII.G. Florida High Tech Corridor Council

The Florida High Tech Corridor includes the 21 counties that comprise the service areas of the University of Central Florida and the University of South Florida. This region stretches from Volusia county and Florida's Space Coast on the Atlantic through Metro Orlando and on to Tampa Bay, and there are thousands of high tech companies located along the Corridor. Florida's High Tech Corridor Council was created in 1996 and is co-chaired by the presidents of the University of Central Florida and the University of South Florida. It is comprised of these two universities, the Florida Institute of Technology, and 20 high tech companies that work in partnership with 11 local community colleges and more than a dozen economic development organizations to achieve the mission to attract, retain, and grow high tech industry to Florida's High Tech Corridor. The six sectors targeted by the Council include:

- Aviation and Aerospace
- Information Technology
- Medical Technologies
- Microelectronics
- Modeling, Simulation, and Training
- Optics and Photonics

The Council has sponsored a variety of projects geared at accomplishing its mission, focusing on three strategies:

- Providing matching funds for university and business R&D projects

- Encouraging the development of workforce development initiatives

- Conducting collaborative marketing projects with the local businesses and educational and economic development organizations that raise awareness of the region

Most of the Council's budget is allocated to joint research projects between UCF, USF, and industry partners, and since 1996 the Council has provided $35 million to more than 400 projects with more than 200 corporate and institutional partners. This investment has resulted in the attraction of more than $68 million in matching funds for a total of more than $100 million invested in Corridor research projects, and has also led to a variety of patent applications and royalty agreements between the two universities and their partners.

Recognizing that Florida's high tech future is dependent upon a steady stream of trained high tech workers at all levels, under the TechPATH initiative the Council has brought together a group of university, community college, K-12, and corporate leaders to address this need. TechPATH's accomplishments include the creation of high tech associate degrees, certificates, and curricula; development of high tech training labs through an NSF grant; partnerships with Science Centers to develop high tech educational exhibits; and development of 21 programs called techCAMPS that have provided 1,000 educators with hands-on experience in various high tech environments and tools for incorporating that knowledge into the classroom.

Unfortunately, neither the environmental industry nor the renewable energy industry is among the six sectors currently targeted by the Council, and we recommend that this oversight be remedied. These industries – and the state – would benefit from the types of incentives currently targeted at other industry sectors, e.g. providing matching funds for university and business R&D projects, encouraging the development of workforce development initiatives, conducting collaborative marketing projects, TechPATH initiatives, etc.

VII.H. Florida Research Consortium

The Florida Research Consortium (FRC) is a not-for-profit strategic partnership between Florida's universities, high-technology business sectors, and state government designed to create an environment in Florida that will facilitate the expansion of the state's high-tech sectors, the deployment of new technologies, and the creation of high-skill, high-wage jobs. Collaboration between these groups – in research, technology transfer, and business development -- is essential for Florida to maintain and enhance the competitiveness of its economy. Represented on the board of the FRC are university presidents and tech transfer leaders from Florida's public universities and the University of Miami, private sector business leaders from the spectrum of Florida's technology industries (e.g., biotech, simulation, artificial intelligence, etc.), and venture capitalists. The Core Functions of the Research Consortium, utilizing a diverse board of high-tech industry and university leaders, include:

- Working with other technology constituents to develop plans, leading implementation of strategies, and advising Florida's elected and appointed government leadership on strategic policy initiatives for expanding and strengthening university research programs and development activities to benefit Florida's high-tech industries

- Establishing new, and enhance existing, leading-edge research programs at Florida's universities

- Educating, advocating, and communicating the vision, mission, and strategies of the Florida Research Consortium to Florida's key audiences

- Promoting technology commercialization by the growth of strategic partnerships between academic and industry researchers and scientists

- Identifying and securing human and fiscal resources to implement Florida's strategies to grow research and development activities

The FRC has thus far not focused on environment-related industries, and we recommend that such a focus be added. This would integrate well with the Consortium's core functions, which include establishing new leading-edge research programs, strengthening university research programs and development activities to benefit Florida's high-tech industries, and promoting technology commercialization by the growth of strategic partnerships.

VII.I. Enterprise Florida

Enterprise Florida, Inc. (EFI) is the public-private partnership responsible for leading Florida's statewide economic development efforts. EFI was formed in July 1996, when Florida became the first state in the nation to replace its Commerce Department with a public-private organization that is responsible for economic development, international trade, and statewide business marketing. EFI also works collaboratively with a statewide network of regional and local economic development organizations ("Partners") to continually improve Florida's business climate and ensure its global competitiveness. A Board of Directors -- comprised of leaders from Florida's business, economic development, educational and government communities -- provides broad based policy direction. The Governor of Florida serves as the chair of the Board.

EFI's mission is to diversify Florida's economy and create better-paying jobs for its citizens by supporting, attracting, and helping to create businesses in innovative, high-growth industries. EFI focuses on growing high-wage, high-value clusters that help to diversify Florida's economy, including international commerce, information technology, life sciences, aviation/aerospace, homeland security/defense,

modeling/simulation/training, and financial/professional services. EFI also works collaboratively with a statewide network of regional and local economic development organizations that can provide specialized assistance in all of Florida's 67 counties.

The EFI represents another vehicle that could be used by the state to facilitate the growth and development of environment-related industries and jobs throughout Florida, even though it is not currently doing so. Such facilitation could help the EFI achieve its objective of diversifying Florida's economy and creating better-paying jobs by supporting, attracting, and helping to create businesses in innovative, high-growth industries.

Importantly, we have found that one of the factors inhibiting the growth of high-tech environment-related industries and jobs in different states is the failure of state colleges and universities to develop curricula that provide students with the requisite skills. We recommend that the Florida High Tech Corridor Council, the Florida Research Consortium, and Enterprise Florida work together to address this problem in Florida.

VII.J. TREEO Annual Statewide Pollution Prevention Conference

The Florida Department of Environmental Protection annually partners with the University of Florida Center for Training, Research, and Education for Environmental Occupations (TREEO) to host the Annual Statewide Pollution Prevention Conference – the most recent one was held August 4 - 6, 2004, in Gainesville. The conference, theme "Corporate Greening: How Industry Drives Environmental Performance" focused on creating a healthy environment through waste and pollution reduction. Environmental, government, and business professionals gathered to exchange ideas, success stories, and technologies that prevent pollution in the workplace. Experts highlighted green building initiatives, waste treatment and disposal alternatives, and business incentives that increase efficiency, conserve resources, and promote compliance with environmental regulations.

TREEO is a "classically green"-oriented entity. Its recommendations may create jobs, but have no component that maximizes, publicizes, or further develops the current jobs creation benefits or potential. However, the goals are broad enough to include environment-related jobs programs. Thus, the jobs component of these programs could be readily optimized. Ultimately, promotion of environmental industries and sustainable development at significant scale would support diverse businesses and create diverse jobs across Florida.

VII.K. Florida Technology Development Act

The Florida Technology Development Act, SB 1844, was enacted in 2002 and provided for:

- The creation in the state universities of Centers of Excellence designed to facilitate the identification of collaborative research opportunities between universities and businesses; facilitate the acquisition of public and private funding for collaborative research opportunities and maximize the leveraging of such funds; create partnerships between industrial and governmental entities to advance knowledge and research and to move technologies from academic laboratories and research centers to commercial sectors; assist in the enhancement of advanced academic curricula through improved communication between academia and businesses; and recruit and retain eminent scholars in advanced technology disciplines.

- Establishment of the Emerging Technology Commission within the Governor's Office for the purpose of guiding the establishment of centers of excellence within, and in collaboration with, the state university system.

VII.L. The Comprehensive Everglades Restoration Plan

The Problem: The Everglades Ecosystem – and South Florida – in Peril

Over the past century, excessive drainage of wetlands and changes in the natural variability of water flows have altered the Everglades wetland ecosystem on a regional scale. Indicators of current ecosystem problems include:

- 90-95 percent reduction in wading bird populations and 68 plant and animal species are threatened or endangered

- 1.7 billion gallons of water per day on average lost through discharge to the ocean

- 1 million acres of the ecosystem under health advisories for mercury contamination

- Over 1.5 million acres infested with invasive, exotic plants

- Declining population levels of commercially and recreationally important fish species in the St. Lucie and Caloosahatchee estuaries and Biscayne and Florida bays

- Defoliation of seagrasses, fish kills, and deformed fish within the St. Lucie estuary

- Continued reduction in number of birds initiating breeding in south Florida

- Repetitive water shortages and salt water intrusion

The remaining Everglades, and the entire south Florida ecosystem, no longer exhibit the functions, richness, and area that historically defined the pre-drainage system. There have been substantial and irreversible reductions in the size of the ecosystem, and most of the negative changes in the ecosystem are a direct result of water management activities to control floods and provide for water supply. Discharges to the Everglades are often too much, or too little, and frequently at the wrong times of the year. An over abundance or scarcity of water affects plants and wildlife accustomed to the Everglades' historic range of water flows and levels. In addition, canals and highways that criss-cross the Everglades have interrupted its historic overland sheet flow.

Historically, most rainwater soaked into the ground in the region's vast wetlands. As south Florida developed, the canal system built over the past 100 years worked very effectively and drained water off the land too quickly. As a result, approximately 1.7 billion gallons of water per day on average are discharged to the ocean and gulf, and once consequence is that not enough water is available for the environment.

Water quality throughout south Florida has deteriorated over the past 50 years, and more than one-half of the wetlands that act as natural filters and retention areas have disappeared. Some untreated urban and agricultural storm water is sent directly to natural areas and estuaries and too much, or too little, water is often sent to estuaries. Too many nutrients are entering the Everglades, with an over abundance of cattails a visible sign of the results. These natural systems will not recover their defining characteristics under current conditions and cannot be sustained in the future, and the health of the ecosystem will continue to decline unless remediation is undertaken.

Urban and agricultural water shortages are expected to worsen if remediation is not implemented. Drainage, water supply, and flood protection provided by the Central and Southern Florida Project have allowed the growth of south Florida's population. Local governments in south Florida are predicting that the population will reach 8 million by 2010 and will range from 12-15 million by 2050, more than twice the current population. Approximately 64 percent of the region's current population is concentrated in the three lower east coast counties of Miami-Dade, Broward, and Palm Beach. This distribution pattern is expected to remain the same in the future, and urban water supply demands could increase from approximately one billion gallons of water per day today to two billion gallons of water per day by 2050.

Future water demands will cause conflict and the growing demand for a reliable and inexpensive supply of water for agriculture, industry, and a burgeoning population will likely exceed the limits of readily accessible sources. As the needs of the region's natural systems are factored in, conflicts for water among users will become even more severe. Water shortages will become more frequent and more severe unless changes to the water management system are made.

The Solution: The Comprehensive Everglades Restoration Plan (CERP)

The Comprehensive Everglades Restoration Plan (CERP) is a framework and guide to restore, protect, and preserve the water resources of central and southern Florida, including the Everglades. It is the world's largest ecosystem restoration effort and includes more than 60 major components. Because the region's environment and economy are integrally linked, the Plan provides important economic benefits. Thus, CERP will result in a sustainable south Florida by restoring the ecosystem, ensuring clean and reliable water supplies, and providing flood protection.

CERP is a joint federal-state effort, covers 16 counties over an 18,000-square-mile area, and centers on an update of the Central & Southern Florida (C&SF) Project. The current C&SF Project includes 1,000 miles of canals, 720 miles of levees, and several hundred water control structures and provides water supply, flood protection, water management, and other benefits to south Florida.

The plan is designed to capture, store, and redistribute fresh water previously lost to tide and to regulate the quality, quantity, timing and distribution of water flows. It involves the expenditure of $8 billion over the next quarter-century for the development of:

- Surface Water Storage Reservoirs
- Water Preserve Areas
- Management of Lake Okeechobee as an Ecological Resource
- Improved Water Deliveries to the Estuaries
- Underground Water Storage
- Treatment Wetlands
- Improved Water Deliveries to the Everglades
- Removal of Barriers to Sheetflow
- Storage of Water in Existing Quarries

- Reuse of Wastewater
- Pilot Projects
- Improved Water Conservation
- Additional Feasibility Studies

CERP represents an excellent example of an essential environmental/ecosystem program that will restore and protect the Florida environment while at the same time facilitating economic development and job growth.

VIII. SUMMARY OF MAJOR FINDINGS

This report presents information about jobs creation and the potential of the environmental industry in the state of Florida, as well as background information on the jobs impact of the environmental industry in the nation as a whole. The report finds that the environmental industry is a major player in both the state and national economy, and that the direct and indirect jobs creation potential of the environmental industry is significant, multi-sectoral, under-appreciated, and could be maximized for broad socio-economic and environmental benefit.

Jobs and the National Environmental Industry

The report summarizes MISI findings on the national environmental industry. MISI research has found that over the past four decades, protection of the environment has grown rapidly to become a major sales-generating, profit-making, job-creating U.S. industry. This "industry" ranks well above those in the top of the Fortune 500, and MISI estimates that in 2003 protecting the environment generated:

- $301 billion in total industry sales
- $20 billion in corporate profits
- 4.97 million jobs
- $45 billion in Federal, state, and local government tax revenues

It is likely that the environmental industry will continue to grow significantly for the foreseeable future, and MISI forecasts that in the U.S. real expenditures (2003 dollars) will increase from $301 billion in 2003 to:

- $357 billion in 2010
- $398 billion in 2015
- $442 billion in 2020

Environmental protection generates large numbers of jobs throughout all sectors of the economy and within many diverse occupations, and MISI forecasts that U.S. employment created directly and indirectly by environmental protection will increase from 4.97 million jobs in 2003 to:

- 5.39 million jobs in 2010
- 5.76 million jobs in 2015

- 6.38 million jobs in 2020

Environmental protection created nearly five million jobs in the U.S. in 2003, and these were distributed widely throughout all states and regions within the U.S. The vast majority of the jobs created by environmental protection are standard jobs for accountants, engineers, computer analysts, clerks, factory workers, truck drivers, mechanics, etc. In fact, most of the persons employed in these jobs may not even realize that they owe their livelihood to protecting the environment.

Firms working in the environmental and related areas employ a wide range of workers at all educational and skill levels and at widely differing earnings levels. Even in environmental companies, most of the employees are not classified as "environmental specialists." Rather, most of the workers are in occupations such as laborers, clerks, bookkeepers, accountants, maintenance workers, cost estimators, engine assemblers, machinists, machine tool operators, mechanical and industrial engineers, welders, tool and die makers, mechanics, managers, purchasing agents, etc.

Jobs in Florida and Florida's Environmental Industry

We found that environmental protection is a large and growing industry in Florida. MISI estimates that in 2003:

- Sales generated by the environmental industries in Florida totaled $15.4 billion.
- The number of environment-related jobs totaled more than 220,000.
- The environmental industry in Florida comprised three percent of gross state product.
- Florida environmental industries accounted for five percent of the sales of the U.S. environmental industry.
- Environment-related jobs comprised three percent of Florida employment.
- Environment-related jobs in Florida comprised 4.4 percent of the total number of environment-related jobs in the U.S.
- Environment-related employment in the state has been increasing in recent years between one and two percent annually.

Most of the environment-related jobs in Florida are in the private sector, and these are heavily concentrated in several sectors, including manufacturing, professional, scientific, and technical services, and educational services.

Environmental jobs in Florida are widely distributed among all occupations and skill levels and, while the number of jobs created in different occupations varies substantially, requirements for virtually all occupations are generated by environmental spending. Thus, in Florida as in the U.S. generally, the vast majority of the jobs created by environmental protection are standard jobs for all occupations.

Nevertheless, we found that, in Florida, the importance of environmental protection for jobs in some occupations is much greater than for others. For some occupations, such as environmental scientists and specialists, environmental engineers, hazardous materials workers, water and liquid waste treatment plant operators, environmental science protection technicians, refuse and recyclable material collectors, and environmental engineering technicians, virtually all of the demand in Florida is created by environmental protection activities. This is hardly surprising, for most of these jobs are clearly identifiable as "environmental" jobs.

However, for many occupations not traditionally identified as environment-related, a greater than proportionate share of the jobs are also generated by environmental protection. While, on average, environment-related employment in Florida comprises only three percent of total employment, in 2003 environmental protection generated jobs for a greater than proportionate share of many professional, scientific, high-tech, and skilled workers in the state.

An important finding derived here is the significance of the environmental industry in Florida compared to other sectors of the economy. For example, the tourism industry generates about 540,000 jobs in the state, and Florida well recognizes the key role that tourism plays in the state economy. Here we estimate that environment-related jobs in Florida total 220,000 – jobs that tend to be more highly skilled and better paying than those in the tourism sector. This fact is not widely known or appreciated by policy-makers in the state.

Our survey of existing environmental companies in Florida revealed a wide range of firms, located throughout the state and across sectors. These firms:

- Are located throughout the state, in major urban centers, suburbs, small towns, and rural areas.

- Range in size from small firms of 12 employees to large firms employing thousands

- Are engaged a wide variety of activities, including engineering, remediation, testing, monitoring, analysis, etc.

- Include some of the most sophisticated, high-tech firms in the state; for example:

  -- Blasland, Bouck and Lee, Inc. (Boca Rotan, Naples, Tampa, Tallahassee, and Pensacola), a leading provider of environmental, health, and safety services in the United States and internationally.
  -- Biological Research Associates (Destin, Panama City, Sarasota, Tallahassee, and Vero Beach) provides services in environmental permitting, wildlife and plant ecology, environmental land planning and management, wetland design, planting, maintenance, and monitoring
  -- Environmental Consulting and Technology, Inc. (headquarters in Gainesville and offices in Ft. Lauderdale, Ft. Myers, Jacksonville, Melbourne, New Smyrna Beach, Orlando, Tallahassee, and Tampa) is multidisciplinary environmental consulting firm offering a broad range of planning, management, scientific, and engineering services.
  -- Lang Engineering and Environmental Services (Tampa and Jacksonville) is a leading provider of engineering and environmental services throughout the Southeast.
  -- Severn Trent Laboratories (Miami, Pensacola, Tallahassee, and Tampa) is one of the leading environmental testing companies in the world.
  -- WRS Infrastructure and Environment, Inc. (corporate headquarters in Tampa and offices in Tallahassee, Miami, and Gainesville) provides environmental and technical services to public and private sector customers.

A number of these firms, including Ayres Associates (Jacksonville, Sarasota, and Tampa), Biological Research Associates, Environmental Consulting and Technology, Inc., Glatting Jackson (Orlando and West Palm Beach), Lang Engineering and Environmental Services, Malcolm Pirnie (Ft. Myers, Ft. Lauderdale, Miami, Orlando, and Tampa), Severn Trent Laboratories, and WRS Infrastructure and Environment, Inc. have created significant numbers of new jobs over the past six months.

We identified a number of existing state agencies and initiatives that could be used to maximize the jobs creation benefit and potential of the environmental industry. These include the Governor's Council of Economic Advisors, the Florida Department of Environmental Protection Office of Strategic Projects and Planning and Florida Energy Office initiatives, the Strategic Plan for Economic Development, Florida Hydrogen Initiatives and Incentives, Florida High Tech Corridor Council, Florida Research Consortium, Enterprise Florida, the TREEO Annual Statewide Pollution Prevention Conferences, and the Comprehensive Everglades Restoration Plan. Of these, the Governor's Council of Economic Advisors, the Florida Hydrogen Initiatives and Incentives, the Florida High Tech Corridor Council, the Florida Research Consortium,

Enterprise Florida, and the Comprehensive Everglades Restoration Plan are especially notable and hold considerable promise.

We suggest policy options that could maximize the jobs benefits of the environmental industry in Florida, with no institutional impediment. Such initiatives should be encouraged and expanded. This study demonstrates that environment-related initiatives can create substantial numbers of jobs in Florida, a state that is currently seeking new ideas for employment generation, stable good jobs, and workforce development.

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APPENDIX: U.S. COMMERCE DEPARTMENT ESTIMATES OF THE ENVIRONMENTAL INDUSTRY IN FLORIDA

There are two historical sources of information about the environmental industry in Florida. Unfortunately, they only address certain segments of the industry, do not focus on jobs, and were conducted for 1999. These are briefly summarized below.

International Trade Administration

One estimate of the size of the environmental industry is available through the U.S. Department of Commerce.[13] The Department's International Trade Administration (ITA), Office of Environmental Technologies Industries estimated, for 1999, the world market for environmental products and services and the size of the U.S. market, including estimates at the state and metropolitan statistical area levels. In this example of environmental accounting, the environmental industry is defined to include:

- Environmental-related services
  - -- Environmental testing and analytical services
  - -- Wastewater treatment works
  - -- Solid waste management
  - -- Hazardous waste management
  - -- Remediation/Industrial services
  - -- Consulting and engineering

- Environmental equipment
  - -- Water equipment and chemicals
  - -- Water equipment and chemicals
  - -- Instruments and information systems
  - -- Air pollution control equipment
  - -- Waste management equipment
  - -- Process and prevention technology;

- Environmental resources:
  - -- Water utilities
  - -- Resource recovery
  - -- Environmental energy sources.

[13]See U.S. Department of Commerce, International Trade Administration, Office of Environmental Technologies Industries, *Environmental Industry of the United States*, a USDOC/ITA web-accessible briefing generated by Environmental Business International, Inc. for 1999.

ITA estimated that the 1999 U.S. environmental market totaled $189 billion, almost 38 percent of the global $499 billion market. In meeting the demands of those markets, the U.S. environmental industry was estimated to have generated $196 billion of revenues. ITA also estimated the U.S environmental trade balance for 1999. It estimated that the U.S. exported $21 billion worth of environmental products and services and imported $14 billion, thus generating a positive net U.S. exports balance of just over $7 billion in environmental-related goods and services.

The ITA U.S. industry estimates were disaggregated by state, and Table A.1 lists the estimated industry revenues, jobs, the number of companies, and the exports of the industry in Florida. The ITA estimated that, in 1999, Florida accounted for about 4.9 percent of the U.S. industry, and that the number of environmental jobs in the state totaled more than 66,000.

Table A.1
U.S. Department of Commerce Estimates
of the U.S. and Florida Environmental Industries, 1999

		Florida	U.S.	Florida Share of U.S.
Revenues	(millions)	$9,738.9	$196,465	4.9%
Jobs	(number)	66,522	1,389,638	4.7%
Companies	(number)	5,208	115,030	4.5%
Exports	(millions)	$823.8	$21,310	3.8%

Source: U.S. Department of Commerce (ITA) and Environmental Business International; 1999.

The ITA report disaggregated the Florida industry by metropolitan statistical area (MSA) – see Table A.2. In Florida, this consisted of the Tampa-St. Petersburg-Clearwater, Miami, Ft. Lauderdale, and Orlando MSAs. These MSAs accounted for, respectively, 15 percent, 14 percent, 10 percent, and 10 percent of the industry in the state and about 33,000 environment-related jobs.

Table A.2
U.S. Department of Commerce Estimates of the Florida Environmental Industry by Metropolitan Statistical Areas, 1999

		Tampa-St. Petersburg-Clearwater FL	Miami FL	Ft. Lauderdale FL	Orlando FL
Revenues	(millions)	$1,468	$1,402	$990	$990
Jobs	(number)	10,029	9,577	6,759	6,757
Companies	(number)	785	750	529	529
Exports	(millions)	$124	$119	$84	$84
MSA Average Share of Florida		15%	14%	10%	10%

Source: U.S. Department of Commerce (ITA) and Environmental Business International; 1999.

Census Bureau -- Pollution Abatement Costs and Expenditures (PACE)

The Census MA200 survey has been one of the more respected sources for information on the U.S. environmental industry.[14] This report was not available for a number of years after 1994, but was revived for the year 1999. The results of the survey are not consistent with previous reports for a number of reasons, but they do present a snapshot of major portions of the environmental industry with information available by detailed North American Industry Classification System (NAICS) industry and geographically, by state. However, the survey's biggest weakness is that it only covers the mining (NAICS 21), manufacturing (NAICS 31-33), and electric power generation industries (NAICS 22111). Clearly, the U.S. agricultural, services, transportation, and government sectors have pollution abatement costs and expenditures that contribute to and help define the U.S. environmental industry, but they are not included in the PACE survey. Therefore, while the survey estimates are of sufficient quality, they lack comprehensiveness and describe only a small fraction of the environmentally-related business activities in the U.S.

Table A.3. lists the pertinent information for Florida and the United States from the most recent survey, for 1999. Pollution abatement costs in these selected Florida industries included $127 million of capital expenditures and over $410 million for operating costs. Together with $69 million in operating costs for disposal and recycling activities and other categories of economic activity, the PACE estimates for Florida in

[14]See U.S. Department of Commerce, Economic and Statistics Administration, Census Bureau, *Pollution Abatement Cost and Expenditures: 1999*, MA200(99), November 2002.

1999 totaled $820 million. This represented 2.7 percent of the overall PACE estimates in the United States.

Table A.3
Pollution Abatement Costs and Expenditures Estimates for Florida and the U.S. From the Census MA200 Survey, 1999
(million dollars, except where noted)

	Florida		U.S.		Florida Share of U.S.	
Pollution abatement						
Capital expenditures	127.0		5,809.9		*2.2%*	
Non-hazardous		107.9		4,497.8		*2.4%*
Hazardous		19.1		1,312.0		*1.5%*
Air	37.8		3,463.7		*1.1%*	
Non-hazardous		36.8		2,644.7		*1.4%*
Hazardous		1.1		819.0		*0.1%*
Water	82.6		1,801.9		*4.6%*	
Non-hazardous		64.7		1,488.2		*4.3%*
Hazardous		17.9		313.7		*5.7%*
Solid Waste	5.2		361.9		*1.4%*	
Non-hazardous		5.1		245.5		*2.1%*
Hazardous		0.1		116.4		*0.1%*
Multimedia	1.3		182.3		*0.7%*	
Non-hazardous		1.3		119.4		*1.1%*
Hazardous		-		62.9		-
Operating Costs	410.2		11,864.4		*3.5%*	
Non-hazardous		391.1		8,924.9		*4.4%*
Hazardous		18.4		2,939.5		*0.6%*
Air	241.1		5,069.1		*4.8%*	
Non-hazardous		230.8		3,941.2		*5.9%*
Hazardous		10.3		1,127.9		*0.9%*
Water	80.4		4,586.5		*1.8%*	
Non-hazardous		75.8		3,511.8		*2.2%*
Hazardous		4.6		1,074.6		*0.4%*
Solid Waste	61.4		2,013.3		*3.0%*	
Non-hazardous		58.0		1,320.4		*4.4%*
Hazardous		3.3		692.9		*0.5%*
Multimedia	27.3		195.5		*14.0%*	
Non-hazardous		27.2		151.5		*18.0%*
Hazardous		0.1		44.0		*0.2%*
Disposal and recycling						
Capital expenditures	12.2		398.7		*3.1%*	
Disposal	12.0		267.2		*4.5%*	
Non-hazardous		11.8		218.0		*5.4%*
Hazardous		0.1		49.2		*0.2%*
Recycling	0.2		131.5		*0.2%*	
Operating costs	69.0		4,923.6		*1.4%*	
Disposal	46.4		3,680.9		*1.3%*	
Non-hazardous		34.0		2,466.2		*1.4%*
Hazardous		12.4		1,214.7		*1.0%*
Recycling	22.5		1,242.7		*1.8%*	

Table A.3 (Continued)
Pollution Abatement Costs and Expenditures Estimates for Florida and the U.S. From the Census MA200 Survey, 1999
(million dollars, except where noted)

Pollution prevention	71.3			2,767.9			*2.6%*		
Other expenditures	107.8			3,154.5			*3.4%*		
Site cleanup		35.3			1,039.3			*3.4%*	
Remediation			34.7			827.3			*4.2%*
Replacement			*(D)*			83.1			*(D)*
Other			*(D)*			128.8			*(D)*
Habitat protection		12.3			155.2			*7.9%*	
Monitoring/testing		15.2			599.5			*2.5%*	
Administration		44.9			1,360.4			*3.3%*	
Other payments									
Payments to government	22.1			959.1			*2.3%*		
Permits/fees		21.6			816.6			*2.6%*	
Fines/penalties/charges		0.4			116.3			*0.3%*	
Other		0.1			26.2			*0.4%*	
Tradeable permits - bought	-			20.2			-		
Tradeable permits - sold	-			23.7			-		
Tradeable permits - other	-			12.6			-		
Total	**819.6**			**29,934.6**			***2.7%***		

Source: U.S. Department of Commerce (ESA/Census Bureau), 2002.

ABOUT THE JOBS AND ENVIRONMENT INITIATIVE

The Jobs and Environment Initiative, founded in 2004 by Paula DiPerna, is a pilot program of research, policy analysis and public education. The objective of the Initiative is to examine and demonstrate the links between jobs creation in all sectors of economic activity, including manufacturing, and all aspects of environmental management. The Initiative seeks to describe and analyze current jobs benefits of environmental investment and stewardship; bring further public and policy attention to the strength and scope of the environmental industry; examine potential for further jobs creation; highlight policy opportunities, and improve understanding of the positive contributions of environmental management to economic growth and employment generation, at the local, state, regional, national and international levels. The Initiative conducts state-based and national reports and other inquiries, and is a collaboration between Management Information Services, Inc. (www.misi-net.com) and the Building Diagnostics Research Institute (www.buildingdiagnostics.org). For information contact Paula DiPerna at 607-547-8356

ABOUT MANAGEMENT INFORMATION SERVICES, INC.

Management Information Services, Inc. (MISI) is an economic research firm with expertise on a wide range of complex issues, including energy, electricity, and the environment. The MISI staff offers expertise in economics, information technology, engineering, and finance, and includes former senior officials from private industry, federal and state government, and academia. Over the past two decades MISI has conducted extensive proprietary research, and since 1985 has assisted hundreds of clients, including Fortune 500 companies, nonprofit organizations and foundations, academic and research institutions, and state and federal government agencies including the National Academy of Sciences, the U.S. Department of Energy, the U.S. Environmental Protection Agency, the Department of Defense, and the Energy Information Administration.

For more information, please visit the MISI web site at www.misi-net.com.

ABOUT THE BUILDING DIAGNOSTICS RESEARCH INSTITUTE

The Building Diagnostics Research Institute, Inc. (BDRI) is a Section 501(c)(3) not-for-profit organization dedicated to providing the highest level of research, education and training, and public outreach on issues related to the effects of building performance on health, safety, security, and productivity. The Institute’s mission is to leverage more than 25 years of building diagnostics experience in order to enhance health, safety, security, and productivity, and it is implemented by conducting basic and applied research, providing education and training for health and building professionals, disseminating knowledge, and serving as an advocate for the general public. BDRI's basic and applied research, its education and training, and its public outreach are

carried out by an interdisciplinary team of staff and external scientists and professionals representing a variety of disciplines, including chemistry, industrial hygiene, engineering, microbiology, and law and public policy.

For more information, please visit the BDRI web site at www.buildingdiagnostics.org.

BIOGRAPHICAL INFORMATION

Paula DiPerna, founder of the Jobs and Environment Initiative, served formerly as President of the Joyce Foundation, and Vice-President for International Affairs for the Cousteau Society and is a widely published author and public policy analyst.

Roger H. Bezdek, Ph.D., is President of Management Information Services, Inc. He has 30 years experience in consulting and management in the environmental, energy, economic forecasting, and regulatory areas, serving in private industry, academia, and the Federal government. He has served as a consultant to the White House, Federal and state government agencies, environmental organizations, and various corporations and research organizations. Dr. Bezdek, is an internationally recognized expert in economic forecasting and environmental analysis, and is the author of four books and of 200 articles in scientific and technical journals. He received his Ph.D. in Economics from the University of Illinois (Urbana).

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James E. Woods, Ph.D. is CEO of the Building Diagnostics Research Institute. He has 35 years experience in management and consulting in the environmental industry, serving in academia, industry, and as an advisor to DOE, EPA, NIST, and the National Academy of Sciences. He has extensive experience in end-use demand in the residential, commercial, and industrial sectors, environmental factors, and energy modeling, has managed 20 large scale energy and environmental research projects, and is the founder of the Building Diagnostics Research Institute. He received a Ph.D. in Mechanical Engineering from Kansas State University.