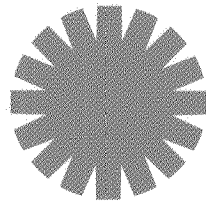


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2012 Annual Report

Letter from the Chairman and CEO

"The current market environment presents an opportunity to focus on technological advancement and innovation, and also to address previously underserved or emerging market segments. Spire is resolved to take advantage of these opportunities by maintaining its position as a leader in the PV equipment market."

-Roger G. Little

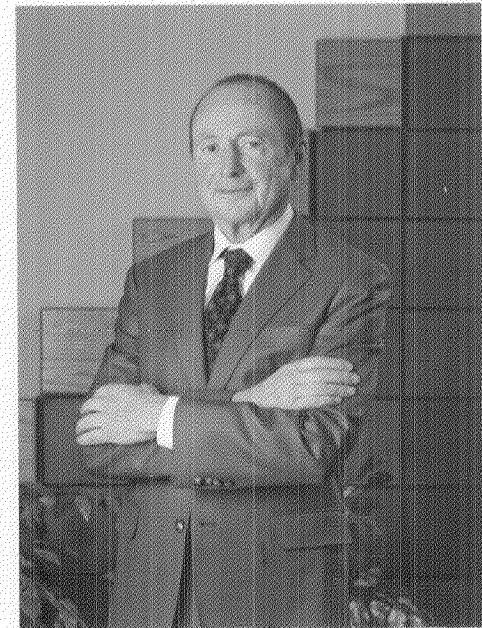
Dear Stockholders, Customers, and Employees:

2012 was a challenging year for the photovoltaic (PV) manufacturing industry. Although worldwide PV installations continued to grow, a significant oversupply of modules driven by rapid expansion of manufacturing capacity in previous years resulted in a greater than 70% drop in year-over-year PV equipment sales. This had a major impact on our business. However, because we anticipated the downturn, we took proactive measures to reduce cost. We also completed the divestiture of our semiconductor business unit for an aggregate consideration of \$8.5 million, strengthening our financial position. Consequently, we are able to continue looking forward and appropriately plan for the coming market recovery.

The current market environment presents an opportunity to focus on technological advancement and innovation, and also to address previously underserved or emerging market segments. Thus, we remain focused on advancing the state-of-the-art in PV manufacturing equipment, particularly with our industry-leading Spi-Sun simulators. We have also expanded our worldwide presence with representation in new regions and countries such as Romania and Turkey, where we see emerging opportunities fueled by government incentives for locally manufactured

components (so called "Regional Manufacturing"). With our advanced equipment, process knowledge, and comprehensive understanding of the entire PV value chain, companies in these areas—many of which are new entrants to the PV market—can greatly benefit from a Spire partnership.

A further advantage that Spire provides to both existing and new PV manufacturers is access to our Advanced Technology Center (ATC) laboratory. Spire's ATC contains a fully operational module production line and allows Spire and our customers to develop new module technologies. It also permits customers to obtain certification for their





modules much faster and with lower initial capital investment. As highlighted below and in the body of this report, the breadth of our experience combined with our advanced product offerings make Spire unique in the PV equipment business.

Spi-Sun Simulators

Spire has now provided the PV industry with over 600 solar simulators, and we continue to be recognized as the world leader in PV module performance measurement. Sun simulators are critical to the module manufacturing process since they are used to determine module power, which ultimately impacts selling price. Accuracy and reliability of this equipment is paramount to a manufacturer's success, particularly as the industry confronts compressed margins and increasing competition. During the second quarter, we completed and shipped our 250th Spi-Sun Simulator™ 4600SLP. The 4600SLP provides a light source that closely matches the solar spectrum, and its versatility has made it a staple for both large-scale module manufacturers and certification laboratories worldwide.

New Manufacturing Equipment Technology

Spire maintains its leadership position through continual improvement and introduction of new equipment, such as the

Spi-Sun Simulator™ 5600SLP. The 5600SLP provides superior measurement accuracy and precision for critical module performance measurements. It delivers Class A+ spectral/spatial/temporal performance in combination with industry-leading measurement repeatability, and it has expanded wavelength capability for high efficiency crystalline silicon and thin film modules. The 5600SLP simulator is ideal for use in applications ranging from research and development (R&D) to high volume automated production. We anticipate sales of this new system to increase as module manufacturers replace older equipment, address measurement needs of high efficiency module technology, and expand production.

New Module Designs

Reinforcing Spire's dedication to quality, innovation and commitment to provide our customers with the best module designs, materials, and supply chain solutions, Spire's latest PV module design and associated Bill of Materials (BOM) achieved the Master UL Listing by Underwriters Laboratories, Inc. To develop this design, Spire utilized its ATC and worked closely with partners to obtain the best available back sheet and encapsulation materials. This new module allows Spire customers more flexibility in module design, faster and less risky certification, reduced cost

to submit a module for design-type qualifications, and enhanced durability. Our customers can receive the UL mark in as few as three weeks from startup as opposed to the typical four month lead time.

The Future

Despite recent setbacks in the PV equipment market due to module manufacturing overcapacity, growth of installed PV energy systems worldwide remains strong and is forecast to grow rapidly for the foreseeable future. Thus, we expect the supply-demand imbalance to eventually resolve itself prompting a new round of capacity expansions and capital equipment purchases. This expansion will likely be accompanied by significant re-tooling consisting of equipment upgrades in existing factories, as well as continued geographical expansion of the worldwide PV manufacturing base. Spire is resolved to take advantage of these opportunities by maintaining its position as a leader in the PV equipment market and continuing to advance the state-of-the-art through technological innovation.

As always, we appreciate your support.

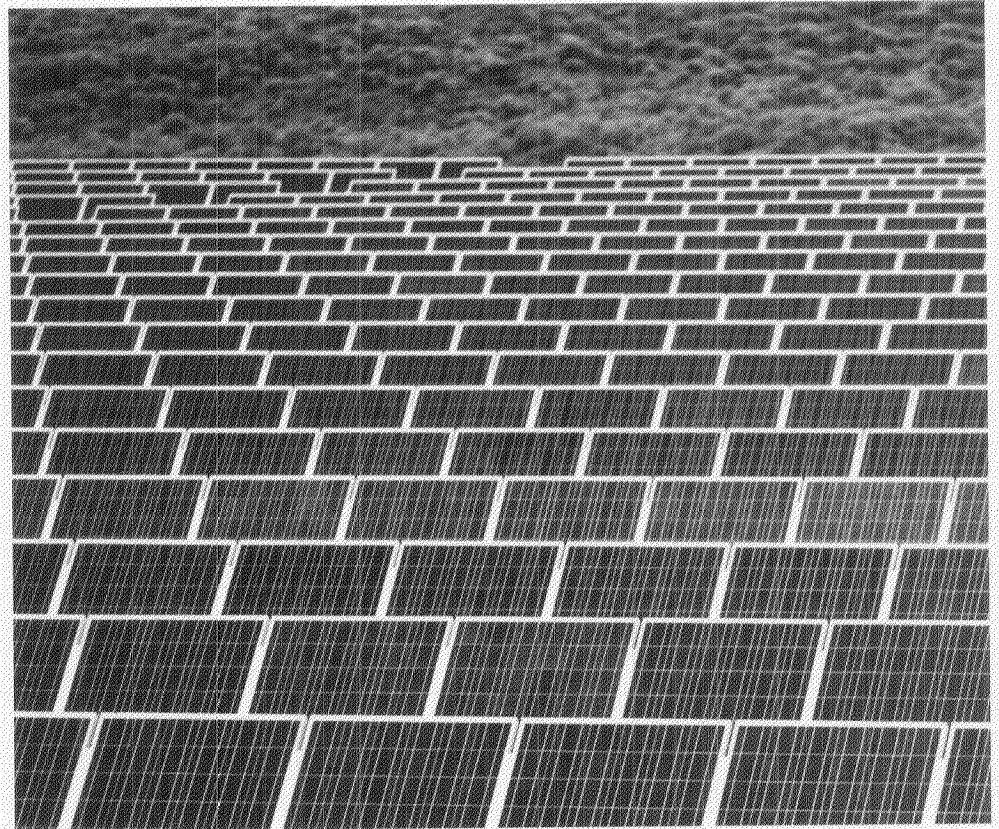
Roger G. Little
Chairman of the Board,
Chief Executive Officer
and President

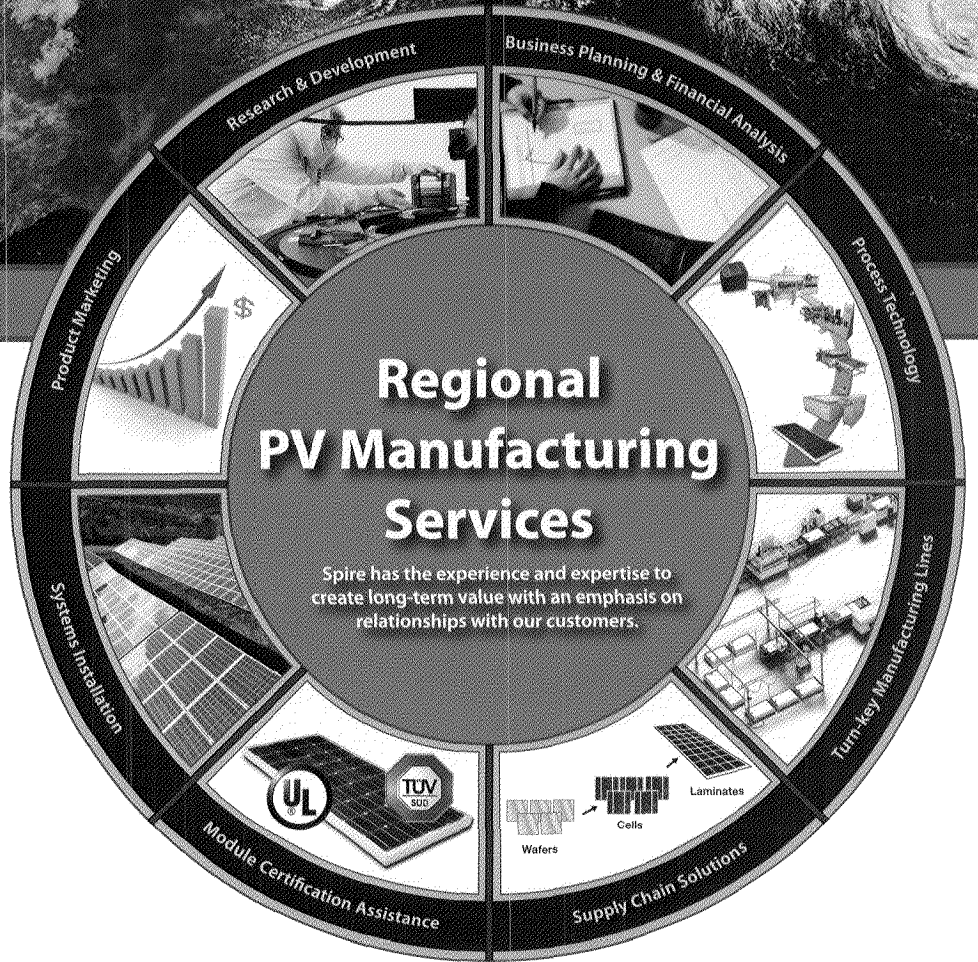
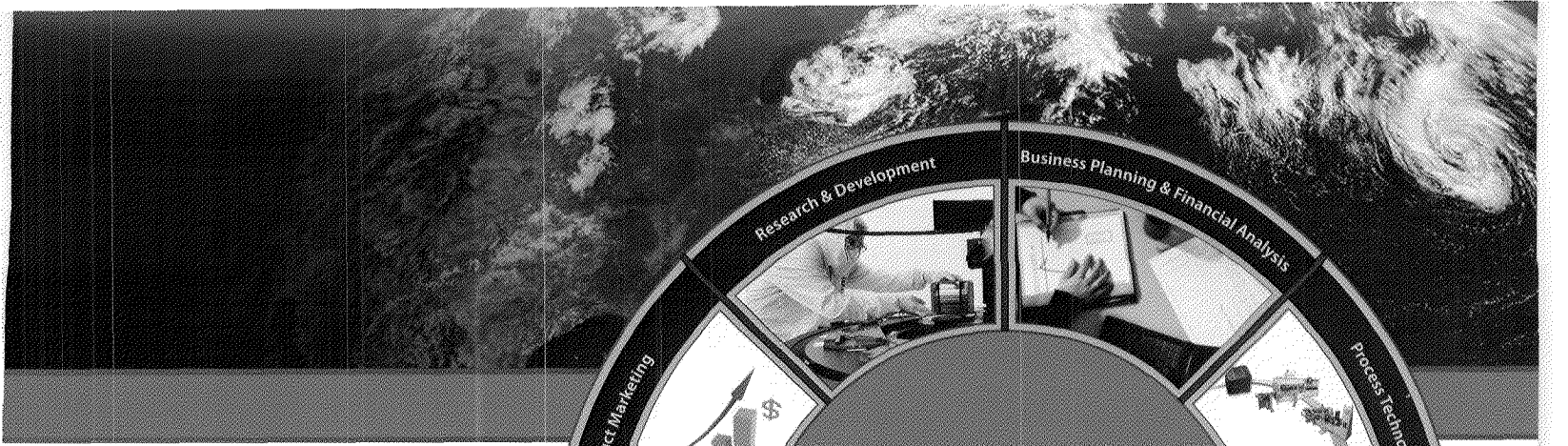
Regional PV Manufacturing Services Provide a Full Turn-key Business Solution

An ideal strategic partner, Spire differentiates itself from the competition by providing a single-source solution for our customers. In addition to being a market leader in PV manufacturing equipment, Spire offers a wide range of services particularly well suited to Regional Manufacturers in emerging PV markets around the world. We help navigate our Regional Manufacturing customers through both upstream and downstream aspects of the solar PV value chain.

In 2012, over 65% of the PV modules shipped worldwide were produced in China and Taiwan, compared to less than 2% a decade prior. Realizing the importance of this growing industry to their local economies, governments in other regions have begun creating incentives to encourage development of PV systems that incorporate locally-derived materials. This is driving the growth of regional manufacturers in emerging PV markets such as the US, India, South America, Eastern Europe, Africa, the Middle East, and Central and South Asia.

Many of these regional manufacturers are new to the PV market, and Spire is the ideal partner to assist them as they establish their factories and begin producing modules. Spire offers not only advanced PV equipment and turn-key lines but also embedded process recipes and knowledge that are unique to the industry. Thus, Spire helps these companies become established and provides an edge over their competitors to grow in their respective regional markets. Our expertise spans the entire range of PV module manufacturing services including:





Business Planning and Financial Analysis

Regional Manufacturers can count on Spire's expertise in determining production costs, job creation, investment considerations, and pro-forma financial statements.

Turn-key Manufacturing Lines

Spire has supplied turn-key module manufacturing lines for over three decades, setting up 65 fully operational factories around the world. Spire currently offers semi- and fully-automated lines with Spire-brand equipment at production capacities ranging from 20MW to 100MW annually. The Company also offers turn-key lines for wafer and solar cell manufacturing.

Process Technology

With over 35 years in the PV business, Spire has gained extensive processing and module materials expertise supported by investments in advanced module materials and designs and new PV process equipment capabilities. Spire provides complete process knowledge transfer and training for its customers.

Supply Chain Solutions

Material supply is crucial for the success of new PV market entrants. Through its strategic partnerships, Spire can procure high quality components for our turn-key line customers from reputable vendors at reasonable cost.

Product Certification Assistance

Spire's ATC assists customers with Materials R&D, Module Design, and Fast-Track Module Certification Assistance, significantly improving time-to-market.

Product Marketing

As a trusted and reputable leader in the PV industry, Spire has built a huge network of business connections around the globe that represent a potential customer-base for new and existing clients.

Systems Installation

Spire provides design, installation and maintenance services for PV systems through its Spire Solar Systems business. The Company

has an expert team of system engineers, project managers, and financial experts ready to assist turn-key module line customers with PV systems installation projects.

Research and Development

Since its founding in 1969, Spire has continually advanced the state-of-the-art in PV and other semiconductor-related fields via completion of over 500 government- and commercially-funded R&D programs.



Spi-Sun Simulator™ 5600SLP

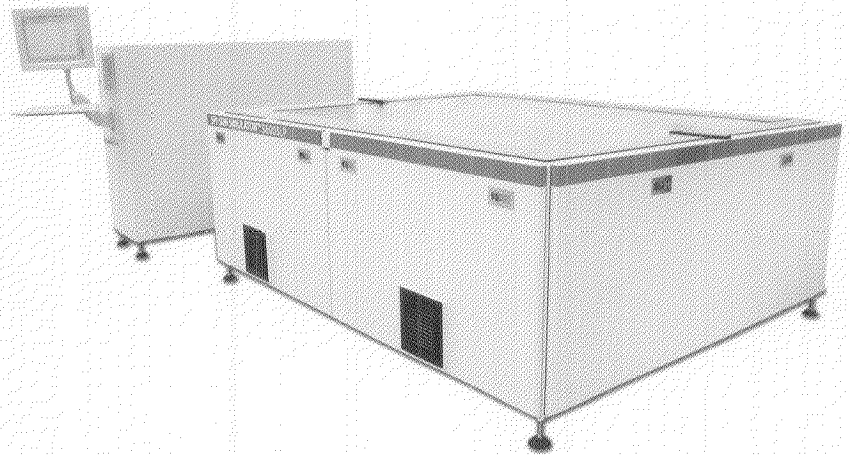
The Spi-Sun Simulator 5600SLP sets the industry standard for module performance measurements.

A New Standard in PV Module Performance Measurement

The Spi-Sun Simulator 5600SLP provides superior measurement accuracy and precision for critical module performance measurements. The system allows for better control of "measurement uncertainty" by delivering Class A+ spectral/spatial/temporal performance in combination with a measurement repeatability of $\leq 0.15\%$. The 5600SLP's unique features—pulse widths exceeding 130ms and single flash "triple curve" multi-irradiance testing—enable measurement of high efficiency silicon, thin film, HIT and multi-junction modules. These versatile capabilities make the simulator ideal for use in applications ranging from R&D to high volume automated

production. The innovative optical design also makes the system uniquely suited as a measurement instrument for laboratory institutions and leading national certification organizations. The 5600SLP supports a wide range of module types and sizes, and its low profile design facilitates integration into any type of production environment.

The 5600SLP's superior accuracy delivers reliable measurement results, enabling traceability to international (gold) module standards certified by the world's leading certification bodies. Spire's simulators are the industry standard for test organizations worldwide including NREL, UL, TÜV, FSEC, EC-JRC, CSA, KIER, Exova, Intertek.



World Leader in Module Performance Measurement

Selected Financial Data

Executive Officers

- Stephen J. Hogan**
Executive Vice President and
General Manager, Spire Solar
- Rodger W. LaFavre**
Chief Operating Officer
- Robert S. Lieberman, CPA**
Chief Financial Officer and Treasurer
- Mark C. Little**
Chief Executive Officer,
Spire Biomedical
- Roger G. Little**
Chairman of the Board,
Chief Executive Officer
and President

Board of Directors

- Udo Henseler, Ph.D., CPA**
President and proprietor
Management Services International
(business development services for
biotechnology, life sciences and other
industrial firms)
- Michael J. Magliochetti, Ph.D.**
Operating Partner
Riverside Partners, LLC
(a private equity firm focused on investing
in middle market healthcare and
technology companies)
- David R. Lipinski**
Executive Vice President and
Chief Financial Officer, KMS Solutions, LLC
(a defense professional services enterprise)
- Guy L. Mayer**
Former President and Chief Executive Officer
Ascension Orthopedics, Inc.
(implant technology for the orthopedic
extremities market)
- Mark C. Little**
Chief Executive Officer, Spire Biomedical
Spire Corporation
- Roger W. Redmond, CFA**
Senior Vice President
Marquette Asset Management, Inc.
(investment management and trust
services firm)
- Roger G. Little**
Chairman of the Board,
Chief Executive Officer and President
Spire Corporation

Years Ended December 31,	2012	2011	2010*	2009*	2008*
	(in thousands, except per share amounts)				
Condensed Consolidated Statements of Operations					
Net sales and revenues	\$22,110	\$58,742	\$79,842	\$69,871	\$64,964
Gain on termination of contracts	35	409	1,888	3,123	6,761
Income (loss) from continuing operations before income taxes	(6,730)	(976)	(3,043)	(10,905)	5,725
Income tax benefit (provision) – continuing operations	1,951	890	1,146	2,241	(270)
Income (loss) from discontinued operations, net of tax	2,921	(1,397)	1,489	3,382	(680)
Net income (loss)	\$ (1,858)	\$ (1,483)	\$ (408)	\$ (5,282)	\$ 4,775
Basic income (loss) per share	\$ (0.22)	\$ (0.18)	\$ (0.05)	\$ (0.63)	\$ 0.57
Diluted income (loss) per share	\$ (0.22)	\$ (0.18)	\$ (0.05)	\$ (0.63)	\$ 0.56
Weighted average number of common and common equivalent shares outstanding – basic	8,579	8,386	8,341	8,334	8,329
Weighted average number of common and common equivalent shares outstanding – diluted	8,579	8,386	8,341	8,334	8,465

*The Condensed Consolidated Statements of Operations for year 2008-2010 have not been adjusted for discontinued operations of the semiconductor business unit.

Condensed Consolidated Balance Sheets

Cash and cash equivalents	\$ 3,030	\$ 4,758	\$ 6,259	\$ 8,999	\$ 5,971
Total assets	16,625	24,178	34,585	53,393	68,018
Working capital	6,616	5,700	5,166	3,718	6,835
Stockholders' equity	7,452	8,710	9,905	9,504	13,518

The Company's Form 10-K for the year ended December 31, 2012 filed with the Securities and Exchange Commission, contains an audited consolidated balance sheet of Spire Corporation and subsidiaries as of December 31, 2012 and the related consolidated statements of operations, comprehensive income (loss), stockholders' equity and cash flows for each of the years in the two-year period ended December 31, 2012.

STOCK EXCHANGE INFORMATION

The Company's common stock is traded on the Nasdaq Capital Market under the symbol "SPIR." On April 2, 2013, the common stock was held by 238 shareholders of record. The number of holders does not include individuals or entities who beneficially own shares but whose shares are held of record by a broker or clearing agency, but does include each such broker or clearing agency as one record holder.

The Company did not pay any cash dividends during 2012 and currently does not intend to pay dividends in the foreseeable future so that it may reinvest its earnings in the development of its business.

ANNUAL MEETING OF STOCKHOLDERS

The Special Meeting in Lieu of the 2013 Annual Meeting of Stockholders is scheduled to be held at 10:00 a.m. on Thursday, May 16, 2013 at Spire Corporation, One Patriots Park, Bedford, Massachusetts.

INVESTOR RELATIONS

For further information about the Company or additional copies of this annual report, Form 10-K or other information, visit the Company's website at www.spirecorp.com. The Company will provide to any person without charge, upon request, a copy of the Form 10-K. Any person wishing a copy should write to Spire Corporation, Investor Relations, One Patriots Park, Bedford, Massachusetts 01730-2396.

TRANSFER AGENT AND REGISTRAR

American Stock Transfer & Trust Company, LLC
Brooklyn, New York

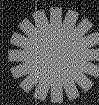
INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

McGladrey LLP
Boston, Massachusetts

GENERAL COUNSEL

Greenberg Traurig, LLP
Boston, Massachusetts

Certain matters described in this annual report, including those relating to Spire's prospects for growth, constitute forward-looking statements under the federal securities laws. The discussion of forward-looking information requires management of the Company to make certain estimates and assumptions regarding the Company's strategic duration and the effect of such plans on the Company's financial results. These forward-looking statements are subject to risks and uncertainties that could cause actual results to differ materially from those indicated in the forward-looking statements. Such risks and uncertainties include, but are not limited to, the risk of dependence on market growth, competition and dependence on government agencies and other third parties for funding contract research and services, as well as other factors described in the Company's Form 10-K and other periodic reports filed with the Securities and Exchange Commission. Forward-looking statements contained in the events or circumstances occurring after such date may render these statements incomplete or out of date. The Company undertakes no obligation and expressly disclaims any duty to update such statements.



spire

Spire Corporation

One Patriots Park

Bedford, MA 01730-2396 U.S.A.

t: +1.781.275.6000

f: +1.781.275.7470

www.spirecorp.com