

Optimizing the Clean-Tech Manufacturing Mix

As demand for renewable energy and clean technologies grows, original equipment manufacturers (OEMs) have the opportunity to create new revenue streams in these markets. Control systems are a critical part of clean technologies – yet they are not the core focus for clean tech OEMs, who need solutions to design and manufacture control systems with high quality, efficiency, and low risk.

This paper will consider the unique characteristics of the renewable energy and clean-tech sectors and explore how a smartly optimized electronics manufacturing outsourcing model can help OEMs accelerate their time-to-market and support their cost-per-kilowatt reduction goals.

Clean-Tech Control System Challenges

Control systems used in clean technologies share a number of characteristics can be challenging in manufacturing environments. In particular, control systems:

- Contain a mix of **analog and digital components**, which adds to the complexity of the manufacturing process.
- Have **packaging and final assembly requirements** beyond simple board assembly.
- Newer technologies may integrate control and communications **within one chip**.
- Are typically produced in **low volumes**.
- Are **decreasing in size** to fit into ever-shrinking clean technologies.

These characteristics pose unique manufacturing challenges. With shrinking PCB geometries, increasing component densities and growing use of limited-access integrated circuits (ICs), many clean-tech components offer limited access to manufacturing test points. This can make it difficult to manufacture and test subsystems effectively.

Most importantly, though, the manufacturing challenges listed above can divert focus away from the core business function of OEMs in the clean-tech sector, which is supplying innovative clean-tech solutions for specific applications and industry segments. For these reasons, OEMs in the clean-tech sector turn to contract manufacturers (CM), also known as electronics manufacturing service (EMS) providers, for the manufacturing expertise, infrastructure and economies of scale they can offer.

The Advantages of Outsourcing

Through a smartly optimized electronics manufacturing outsourcing model, OEMs can focus on their core competencies, increase time-to-market, reduce costs, achieve economies of scale, expand their geographic markets and achieve better performance in the field. A strong relationship with the right CM can help clean tech OEMs in these ways:

1. Focus on Core Competencies

Electronics manufacturing is not a core business function for most OEMs in the clean technologies and renewable energy sectors. This is particularly true of small or emerging clean-tech manufacturers whose funders are intent on seeing the company develop solid intellectual property and highly marketable products.

Control device algorithms and manufacturing processes are transferrable and largely reusable – in themselves they are not sources of intellectual property or differentiation. This makes them ideal for outsourcing. By





outsourcing the manufacturing of these components, OEMs can focus on their market strategies and reserve the resources that would otherwise be spent acquiring manufacturing assets, human resources, purchasing and supply chain functions and processes.

2. Increase Time-to-Market

The clean-tech industry is an emerging market and therefore highly competitive. Often, being first-to-market is important to achieve early mindshare with investors and customers. By outsourcing manufacturing duties to a contract manufacturer, OEMs can speed production by taking advantage of efficient, flexible, dedicated and **established** manufacturing services, processes and resources. Experienced contract manufacturers have low ramp-up times and can help OEMs put a new component into production quickly.

Just as important, experienced CMs have the necessary experience and skill set to consult with the OEM on product designs from an early stage. This helps ensure “manufacturability” – i.e. it ensures that the product design supports the lowest-cost, most efficient and low-risk manufacturing processes and materials possible.

3. Take Advantage of Economies of Scale

Since many OEMs in the clean-tech sector produce low-volume products for commercial, residential and institutional use, they may worry that they will not be able to participate in economies of scale when purchasing components for their products. Fortunately, obtaining economies of scale is more dependent upon good processes and relationships than it is on billions of dollars of purchasing power. Many contract manufacturers are therefore setup to minimize the cost-per-transaction.

These economies make their way into the end product and support clean-tech OEMs’ desire to minimize cost per kiloWatt.

High volume, low mix: for mass production of a limited range of products.

Low volume, high mix: for a wide variety of products with fewer pieces per batch.

For example, contract manufacturers such as OCM Manufacturing specialize in low volume, high mix (LVHM) production. These CMs are structured to economically manufacture a variety of products in smaller batches (about 50-10,000 pieces). This kind of organization is uniquely optimized to multi-task. It handles great product variety, frequent customer cycles, a high degree of customer interface and cross-training among staff.

By nature, the LVHM CM is a highly flexible organization and is ideally suited to serve small- to mid-size product volumes. Typically, a LVHM manufacturing facility is smaller than a HVLM setup and may have just one or two lines which support high utilization. This is critical to the business model, as it matches the low-volume customer’s need for economy: the customer does not pay for the overhead of a large, multi-line facility that does not always run at capacity. By working with a low volume, high mix contract manufacturer, clean-tech OEMs can take advantage of manufacturing facilities designed to achieve economies of scale.

4. Partner with an Expert

Collaboration among board designers, manufacturing processes and test methodologies is more urgent today than it has ever been. As clean technology components become increasingly miniaturized, manufacturers are discovering that these electronics are rarely designed with acceptable clearance and test points. This can create barriers to testing which can lead to high incidents of in-field failure.

By working with a contract manufacturer familiar with design-for-manufacturing (DFM) and designed-for-test (DFT) processes in the early phases of design, OEMs can ensure that their final products will be designed optimally for manufacture and will perform well in the field.

5. Expand Geographic Market Access

Since July 2006, companies doing business with European Union Member States must comply with laws regarding the reduction of hazardous substances (ROHS) and the proper disposal of electronics waste. CMs



with ROHS-ready processes therefore provide OEMs with a faster, smoother and less costly route to access European markets.

5. Improve Product Performance

Through outsourcing, OEMs can leverage the automation, quality, delivery and service strengths of a dedicated manufacturing operation. This can result in fewer product returns and lower support costs associated with reduced equipment failure in the field.

Choosing the Right Contract Electronics Manufacturer

No two contract manufacturers are the same and not all CMs will have the capabilities required to produce components for the renewable energy and clean-tech sectors. When choosing a clean-tech manufacturing partner, look for a CM with expertise in the following areas:

- **Control systems:** An ideal CM for clean-tech manufacturers will have experience in the design and manufacture of control systems, monitoring systems, communications systems, sensors, positioning controls and other electronic subsystems. Be sure to ask potential CMs about their knowledge of the clean-tech industry as well, and test their familiarity with newer systems. Lastly, inquire about the CM's familiarity with both custom and commercial off-the-shelf (COTS) control systems, as the use of COTS can help to reduce product costs..
- **Low volume, high mix (LVHM) production:** Low volume, high mix manufacturers are highly flexible organizations by design and are ideally suited for low- to mid-volume production runs of commercial and consumer clean-tech components. For this reason, most LVHM manufacturers are well positioned to produce low volume runs of components found in small wind turbines, rooftop solar photovoltaic (PV) installations, solar thermal appliances, residential smart grid interfaces, commercial “smart building” systems and other renewable energy technologies.

In addition to exploring the production capabilities of a prospective contract manufacturer, OEMs should ensure that the manufacturer is running a sound business operation. To this end, the following five business elements should be considered:

- **Strong supplier relationships:** A CM's buying power can be enhanced through strong relationships with suppliers. This is evidenced through the length of supplier relationships and the availability of reference suppliers.
- **Competitive bidding process:** When performing due diligence on a CM, look into its bidding process. Look for a yearly competitive bidding process (greater frequency may indicate chaotic processes or weak supplier relationships) in which a variety of distributors are able to bid on the CM's total volume for the year. Also look for letters of intent (LOI) with the winning distributors, guaranteeing prices for the year.
- **Full utilization of sourcing infrastructure:** A CM with multiple products and a high-utilization manufacturing facility can fully optimize personnel and other resources in ways that a small company may not be capable of on its own.
- **Efficient enterprise resource planning (ERP) system:** A good ERP system provides tools to minimize the costs of administrative tasks such as generating POs, receiving and holding inventory and more.
- **Offshore sourcing options:** In certain cases, outsourcing parts or labour to offshore locations may provide significant cost savings. Look for a CM that has offshore sourcing capabilities and find out

Choose Wisely

Look for a contract manufacturing partner that offers:

- Electronics manufacturing experience in process control sub-systems
- ROHS compliance
- Customers in the clean-tech sector



what that CM's philosophy is regarding when and what to outsource. To ensure quality and delivery, the CM's processes should extend right to the source through a representative on the ground there.

- **Cradle-to-grave solutions:** The best CMs offer services for every phase of the product lifecycle, and can transition you to a high-volume manufacturer if/when that time comes.

Your Manufacturing Partner for Clean Technologies

By outsourcing the production of clean-tech components to a contract manufacturer, OEMs can bring their innovative products to market more quickly and win market share while also distinguishing themselves through low-cost, reliable products.

OCM Manufacturing provides these advantages to producers of clean technology products. With more than 20 years of electronics manufacturing expertise in process control sub systems, design for manufacture, test design, box-build assembly, supply chain management and packaging, OCM Manufacturing's services are tailored to low- to mid-volume clean-tech products.

OCM Manufacturing can manufacture electronics within:

- Smart grid environmental controls/thermostats
- DC power systems for wind, solar, biogas & hybrids
- Engine efficiency controls
- Wind turbine monitoring/diagnostic systems
- Positioning control modules (single- & multi-axis)

Offering ROHS compliance and experience in the design and manufacture of control systems, monitoring systems, communications systems, sensors, positioning controls and other electronic subsystems, OCM Manufacturing is helping OEMs in the clean tech sector accelerate their time-to-market and reduce production costs.