

**Woodlawn Associates**  
Management Consulting

**Lessons for the Solar PV Industry:**

**U.S. Distribution of  
Residential Construction, Energy, and  
Infrastructure-Related Products**

June 2011

# About Woodlawn Associates

---



- **Boutique management consulting firm founded in September 2009**
- **Offices in Chicago and San Francisco**
- **Significant experience in:**
  - Clean energy
  - Telecommunications
  - High tech
  - Private equity
- **Deep international experience, especially:**
  - China
  - Japan
  - S.E. Asia
  - Germany

# Relevant Experience

---

- **Clean energy business strategy**

- Advised solar residential leasing provider on company strategy
- Through primary research and economic analysis, concluded photovoltaic modules are commodity-like. Advised module manufacturers on importance of cost leadership in commodity markets and on possible differentiation strategies.
- Counseled global wind farm developer on implications of choosing emerging wind turbine vendor over established blue chip alternatives. Examined implications on financing availability, cost, and capital structure.
- Advised wind turbine manufacturers on appropriate level of vertical integration, how to reduce fixed and working capital requirements, and perception by top wind farm developers in the U.S. Benchmarked manufacturing best practices.
- Helped supplier to fuel cell manufacturer evaluate major capacity expansion.

- **Channel management and sales operations**

- Headed \$500 million, 700-person retail sales channel for global mobile phone maker. Overhauled way the company used and managed distributors, dealers, and its own sales force
- Advised PV module manufacturer and dealer on distribution strategy
- Helped electronics manufacturer improve gross margins by 23% with pricing optimization.
- Headed distributed generation sales, business development, and product management for fuel cell manufacturer.

- **Finance and M&A**

- Led or evaluated more than 100 investments for private equity funds, including multiple transactions in energy.
- Helped numerous companies with capital raising, including more than \$45 million in venture funding
- Advised lithium-ion battery firm on valuation and valuation maximization as they sought series C venture funding.
- Helped an \$800 million distributor smoothly integrate a major acquisition.
- Conducted acquisition screen in photo industry. Negotiated purchase agreement and led due diligence.
- Led the financial portions of merger negotiations with a publicly traded competitor of an energy technology company. Provided negotiation support to the company's CEO.

# Summary of Findings

---

- **Woodlawn Associates examined the residential go-to-market strategies of several industries related to construction, energy, and home infrastructure that may have lessons applicable to the solar PV market**
  - Load centers & circuit breakers, hot water heaters, roofing, flooring, generator sets, windows, and central air conditioning
- **In industries with “complex” sales, such as generators, windows, and air conditioning, dealers are a significant part of the channel**
- **In these industries, dealers tend to buy directly from manufacturers or from exclusive distributors**
  - They prefer the direct access to information (on inventory/order status and technology)
  - Manufacturers may benefit, too, by getting their message out with fewer intermediaries
- **Industries with more commoditized products, such as roofing, load centers, and hot water heaters, tend to rely more on wholesalers**
- **Wholesalers are rarely good at market development**
  - Value is in inventory, terms, and bundling of related products from different manufacturers
- **Where sales are made indirectly, producers often have sales and marketing teams that “skip” levels of the distribution chain to generate goodwill, familiarity, and assist downstream partners with marketing and unusually large contracts**

# Key Takeaways for Solar

---

## 1. Producers should consider working directly with as many dealers as economically feasible

- Solar is a “complicated sale” like generator sets, windows, and some central air systems
- Note: Can use hybrid models like third-party logistics to go “direct” without owning logistics assets

## 2. Exclusive distributorships are worth considering as an alternative to direct relationships

- Avoids manufacturer investment in channel personnel and assets, while aligning interests of channel with those of manufacturer
- Distributor could carry complimentary products in which manufacturer has little interest
  - Inverters, racking, wiring, etc.
- Distributor would appropriately balance investments in inventory, training, and customer service to maximize profit potential of its territory

## 3. In any event, generate preference lower in the distribution chain with “skip level” marketing

- Training can generate familiarity and goodwill
- Manufacturer-run dealer programs can build dealer preference and stickiness
  - Co-op marketing, lead generation, supply pipeline visibility, application engineering, customer financing (loans, leases, or PPAs), web-based proposal generation, outsourced engineering and drawings

# Distribution Channels 101

---

- **Distribution channels provide many services; delivery of these can be divided between various parties so customer needs are met at the lowest overall cost**
  - Sales, marketing, monitoring, credit, warehousing, logistics, bundling of complimentary products, risk assumption, etc.
- **For producers, optimal channel design balances several goals:**
  - Maximize producer market share, revenue, and profit
  - Minimize total cost of distribution throughout the channel
  - Optimize return on distribution-specific assets
  - Meet customer needs
  - Maintain sources of market information
- **The relative balance of direct sales vs. use of intermediaries depends on a number of characteristics**
  - Industries tend to use direct sales when buyers are concentrated, transaction value is high, when customization is required, or when sale is complicated
- **Type of intermediary used also depends on several factors**
  - For example, use of wholesalers is common when product is relatively commoditized and value in intermediary is primarily in depth of local inventory and ability to bundle sales with other, related products
- **Companies can use a variety of hybrid channel types to provide maximum customer satisfaction at lowest cost**
  - Third party logistics, fulfillment distribution, or joint sales
- **Manufacturers' ability to build competitive advantage in distribution depends on several key factors:**
  - Value of business to reseller
  - Consistency and predictability
  - Quality of relationship

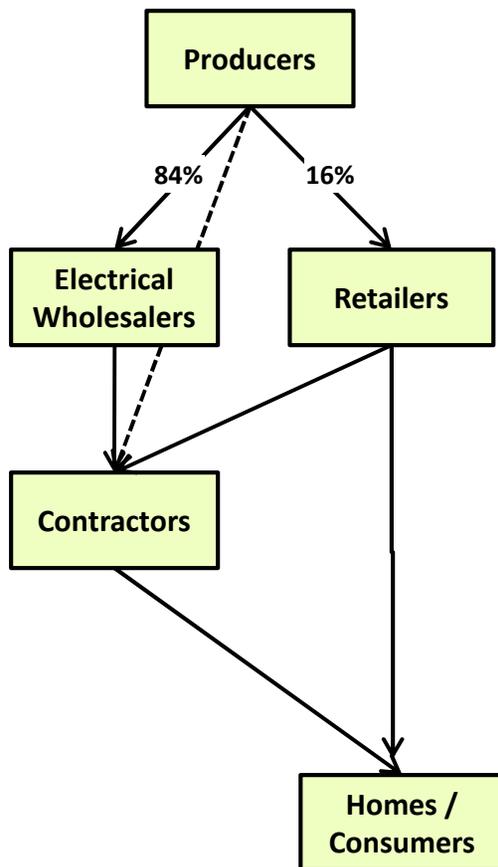
# *Woodlawn has examined possibly analogous industries for lessons that may be applicable to solar*

Product	Related to energy	Professionally installed	Aesthetics important	Long expected life	> \$20,000
Solar PV	Y	Y	Y	Y	Y
Load centers (“fuse boxes”)	Y	Y		Y	
Hot water heaters	Y	Y		Y	
Flooring		Y	Y	Y	Some
Central HVAC systems	Y	Y		Y	Some
Generator sets	Y	Y		Y	Some
Windows and doors	Y	Y	Y	Y	Often
Roofing	Y	Y	Y	Y	Y
Dehumidifiers	Y				
Refrigerators	Y		Y	Y	
Washers & dryers	Y			Y	
Security systems		Y		Y	Some
Sump pumps	Y	Y		Y	
Dishwashers	Y		Y	Y	
Insulation	Y	Y		Y	

Notes: All analogous industries get a significant portion of their business from the U.S. residential market. Industries we examined are those in **bold**.

# Most residential load centers sold through wholesalers; producer sales forces call on major users / influencers

## U.S. Distribution of Residential Load Centers



- Commonly known as “fuse boxes”, load centers in virtually every electrified building; leading producers are Square D (Schneider), GE, Eaton, and Siemens
- About 85% of residential products sold to electrical wholesalers
  - Low unit value; purchased with other electric products; standardized design; widely dispersed buyers
- Major retailers and homebuilders have become important channels
  - Sell directly to large retailers such as Home Depot and Lowe’s
  - Vendors rebate top 50 builders (KB Home, Pulte, etc.) for every home they build in which vendor’s products are specified, but sales are channeled through wholesalers and contractors\*
- Square D noted as having the best-managed distribution network
  - Typically accounts for at least 20-30% of wholesaler revenue
- Has large field sales force even though it relies heavily on wholesalers
  - ~550 field sales reps plus 350 support personnel in the U.S.
  - Sales reps call on wholesalers, but also on large contractors and influencers (consulting engineers and architects). Most orders go through wholesalers, however
  - “I keep my eye on the top 60 electric contractors who focus on residential in my market. If they are doing large jobs and have discretion about what product to use, I’ll work with my distributor to generate a preference for Square D. I gave Cubs tickets to one guy, for example, and he loves us.”  
District Sales Manager, Square D
  - Wholesalers earn 6-15% channel margin, with 8% being typical

### Lessons for Solar

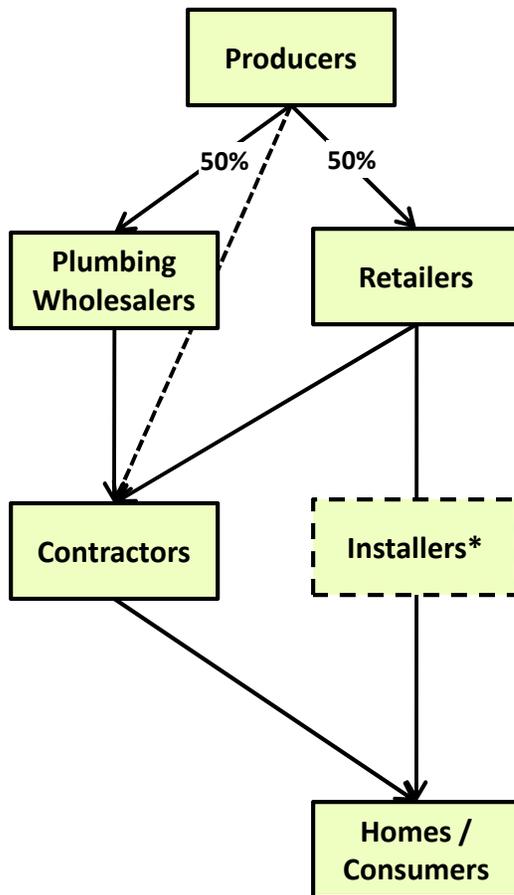
- In some situations it is not economic for manufacturer to have direct sales relationships; does not preclude involvement lower in the distribution chain

Source: Woodlawn Associates, *Going to Market* (Gorey, Cespedes, and Rangan)

Notes: \* Several of the industries we studied work like this with large homebuilders

# Hot water heater market also heavily reliant on wholesalers; retail channel is large, too

U.S. Distribution of Hot Water Heaters



- Major producers include AO Smith, Bosch, GE, Rheem, Rinnai, and Noritz
- Plumbing and HVAC wholesalers such as Ferguson, FW Webb, and Hajoca serve 50% of the market
  - Stock a large variety of plumbing and HVAC products
  - Compete heavily on the basis of local inventory
- Wholesalers don't push producers products, especially for smaller producers, and rely on contractor pull
- Producers have considered forming direct sales relationships with larger contractors, but fear wholesaler retaliation
- Manufacturers offer training classes and sometimes promotions for contractors, though sales go through wholesalers
- Producers sell almost 50% of volume directly to large retailers such as Home Depot and Lowe's
  - Both consumers and (smaller) contractors purchase from retailers
  - "Look at Home Depot first thing in the morning. The parking lot is full of contractors' trucks." SVP, Noritz
  - Retailers also offer vetted installation services through third parties

## Lessons for Solar

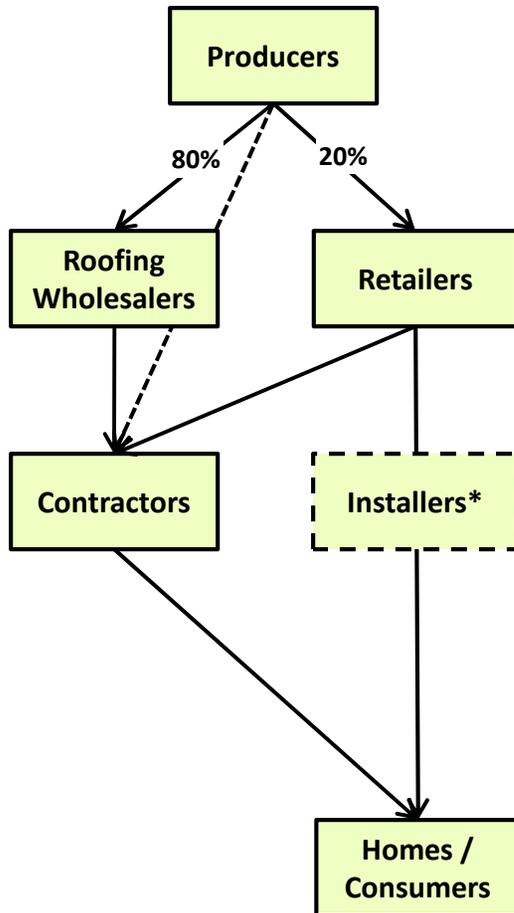
- Wholesalers rarely provide sales "push"—they compete on inventory, bundling, and credit
- Best wholesalers are those where producer business is a significant share of wholesaler's total (makes producer retaliation for poor behavior a credible threat)
- Easier to form direct relationships with contractors/installers and gradually hand smaller accounts to wholesaler than to go the other way

Source: Noritz, Woodlawn Associates

Notes: \* Not involved in the sales cycle, but perform installation services arranged by retailers. Many installers may also be contractors and vice versa.

# *In the roofing market, contractors often have sample kits to review at consumer home*

## U.S. Distribution of Cement Roof Tiles



- Major manufacturers include GAF, CertainTeed (Staint-Gobain), Eagle, and MontierLifetile (Boral)
- Majority of shipments go through non-exclusive wholesalers such as ABC Supply and R&S Supply, but non-trivial amounts go directly to retailers
- Big-box stores such as Home Depot sell roofing material for the consumer and (small) contractor market. They also will typically arrange installation if desired
- Manufacturers maintain relationships with contractors, consulting engineers, and other influencers, but contractor orders are almost always fulfilled by wholesalers
  - Producers provide sales tools, leads, installation training, and credentialing for contractors. Similar programs for architects and builders
  - Manufacturers occasionally sell directly to builders in the case of tract homes where there are a large number of similar roofs
- Consumers view samples at in-home visits by roofing contractors, at design centers operated by major homebuilders, or big-box retail

### Lessons for Solar

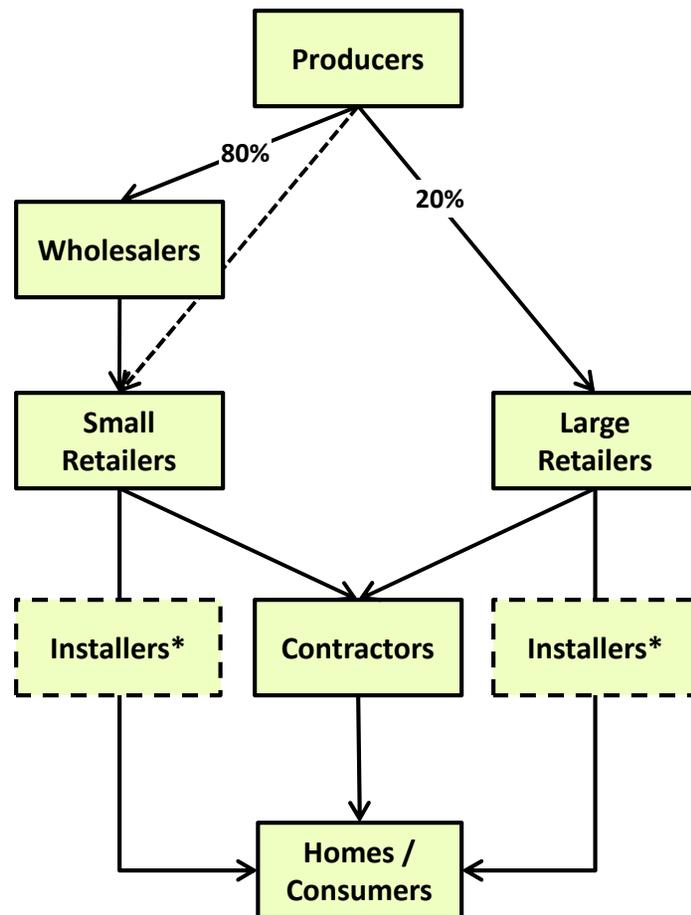
- Possible to maintain relationships with dealers and contractors that are too small for direct sales but too large to leave completely up to distributor or wholesaler

Source: Woodlawn Associates

Notes: \* Not involved in the sales cycle, but perform installation services arranged by retailers. Many installers may also be contractors and vice versa.

# *In flooring, aesthetics are a critical factor so producers recruit retailers; sales fulfilled by wholesalers*

U.S. Distribution of Wood and Manufactured Residential Flooring



- For aftermarket wood and manufactured flooring, leading producers such as Mannington, Congoleum, and Mohawk sell directly to large retailers and indirectly to smaller retailers
- Producers engage directly with retailers to promote their products, but in the case of smaller retailers orders pass through independent wholesalers such as BR Funston, Longust, and Salesmaster Associates, who handle logistics
- Hands on experience is critical to the purchase decision
  - Consumers typically review products in independent showrooms or retail locations (which may be franchised, eg. Flooring America)
  - Independent interior designers or contractors may assist the customer at the showroom with their brand/product selection
- The consumer may self-install some products, but installation is generally done by a professional installer working either for the retailer or contracted directly by the consumer

## Lessons for Solar

- A retail presence is important when aesthetics are critical

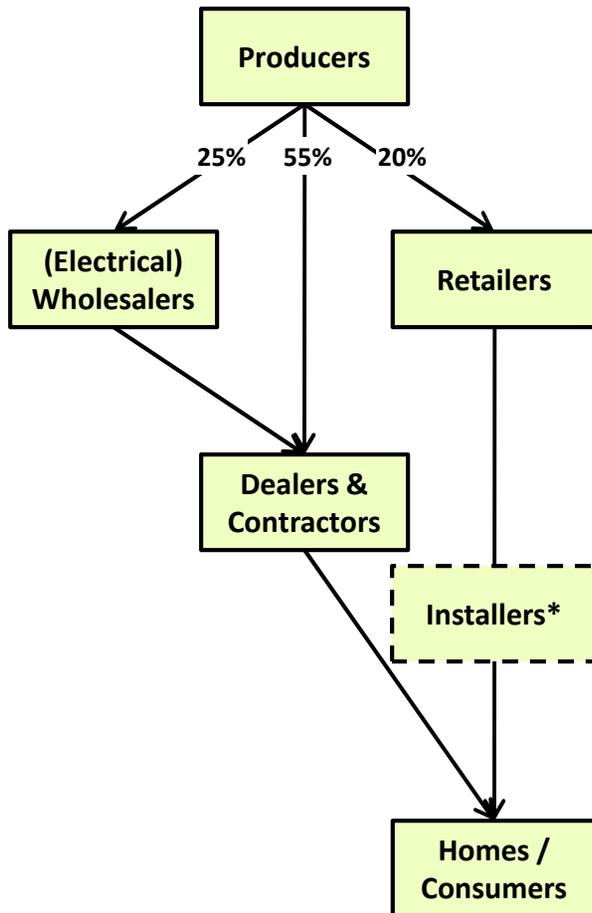
Source: Woodlawn Associates

Notes: \* Not involved in the sales cycle, but perform installation services arranged by retailers. Many installers may also be contractors and vice versa.

Woodlawn Associates

# Backup generator sets sold directly to dealers, largely due to sophistication of sale

## U.S. Distribution of Stationary Standby Generators



- Producers include Caterpillar, Generac, Kohler, Briggs & Stratton, and Cummins
- Wholesalers serve the broad contractor market; contractors who buy from them are typically not specialized in generators
- Generac has ~70% of the \$1B residential standby market
  - Largest portion of sales come from direct sales to dealers. “It is really about taking the message to them...We put the direct dealer channel in place to help sell home standby. We felt we needed to go direct with that message...Distributors add value through inventory and terms—they aren’t market developers.”  
VP, Generac
  - “We deal directly with Generac, which is good because we know exactly when everything is going to be available. With Kohler we have to go through a distributor, and we never know when it is going to be available.”  
President, Generac Dealer A
  - Also sells through retailers and electrical wholesalers. Recently started white-labeling generators for Honeywell to reach HVAC contractors and Siemens and Eaton to reach additional electrical wholesalers
  - Relies on dealers and wholesalers to make sales: “We will support a dealer or wholesaler in a sale if asked, but they largely close their own deals.”  
Director, Generac
  - Offers free training in generator sales, installation, and (basic) service to contractors. Done in conventional classrooms and two semi trailer mobile classrooms

### Lessons for Solar

- Direct manufacturer-dealer relationship may help when developing a new market

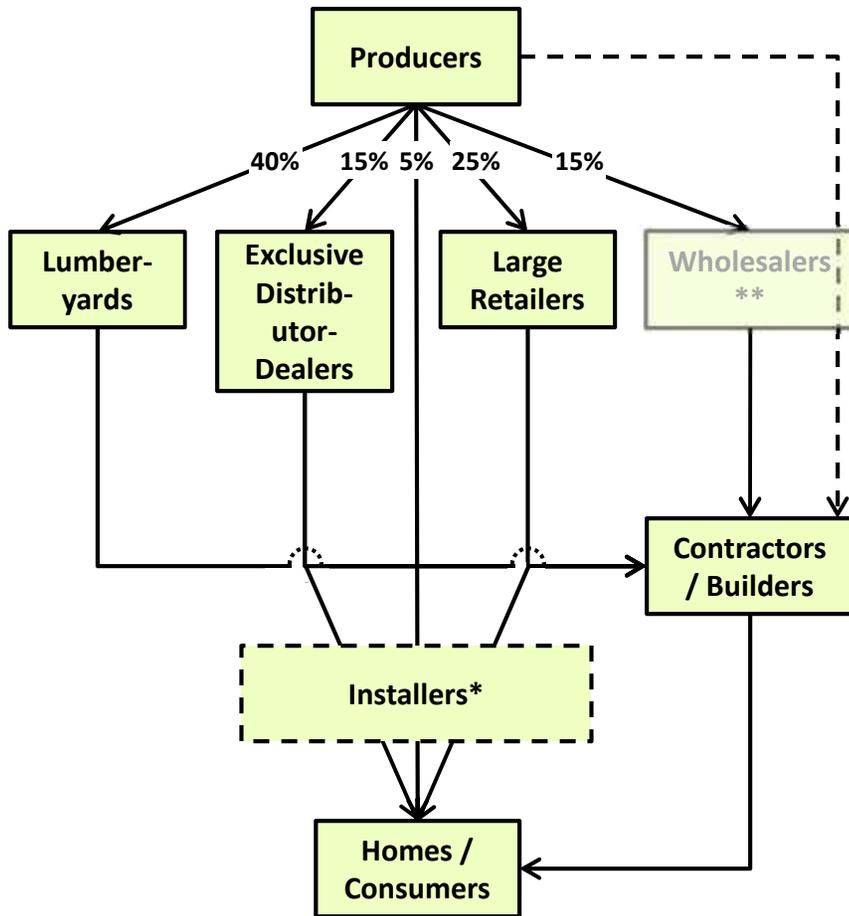
Source: Woodlawn Associates

Notes: \* Not involved in the sales cycle, but perform installation services arranged by retailers. Many installers may also be dealers and vice versa.

Woodlawn Associates

# Dealers also important in windows market, where direct-to-consumer sales are also growing

U.S. Distribution of Residential Windows



- Windows cost \$600-1200 ea installed; larger home can cost >\$20,000
- Major players include Andersen, Jeld-Wen, Pella, and Marvin
- Traditionally, most sales through wholesalers and lumberyards
  - Building-supply wholesalers stock some standard windows, but huge variety in styles makes inventory-based competition difficult, so wholesalers becoming less important
  - Lumberyards typically have personnel to assist contractors and stock complimentary products (such as lumber)
  - Also have trade reps calling on larger contractors, builders, and other influencers
- Pella goes to market with exclusive distributor-dealers
  - Some markets are company owned, in others owned by third parties. In all cases, use the Pella brand
  - Provide high level of expertise and support to contractors due to close connection with headquarters and factory, specialization
  - “Our value to the contractor is that we can help them anticipate problems.”  
President and Co-Owner, Pella Dealer
  - Also have retail showrooms that help consumers choose options and build brand awareness.
- Some sales also made directly to consumers
  - Nationally, Andersen with it’s Renewal line, Pella; Feldco in upper Midwest
- Regional producers mostly sell directly to local contractors
  - Compete on price (use lower-tech windows) and local inventory / manufacturing

### Lessons for Solar

- Exclusive distributors can provide some of benefits of direct sales with lower manufacturer investment
- Consider direct-to-consumer to take total control of customer experience

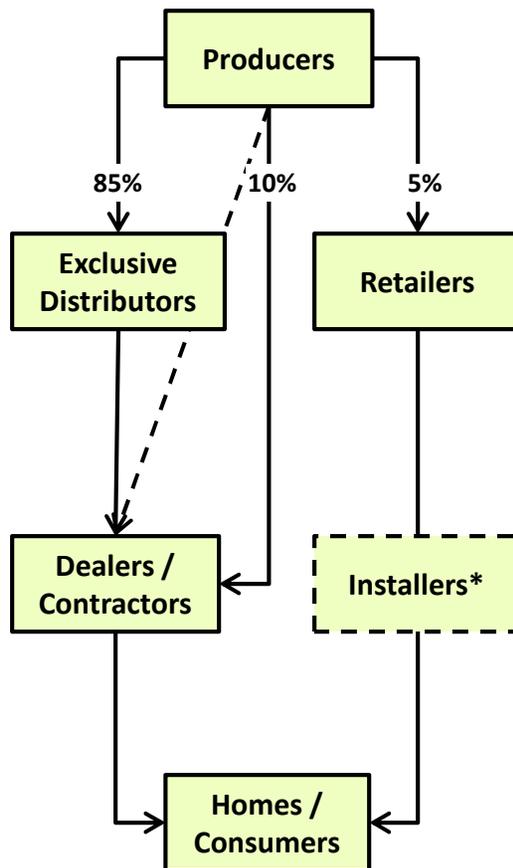
Source: Woodlawn Associates

Notes: \* Not involved in the sales cycle, but perform installation services arranged by others. Many installers may also be contractors and vice versa.

\*\* Regional producers often sell and ship directly to contractors (without a wholesaler)

# Most central air conditioning is sold through exclusive distributors; some sold directly to dealers

## U.S. Distribution of Residential Central Air Conditioners



- Central air conditioners cool the entire home, unlike window or packaged-terminal (“PTAC”) room air conditioners
- Major suppliers include Carrier (United Technologies), Goodman, Lennox, Nordyne, Rheem, Trane (Ingersoll Rand), and York (Johnson Controls)
- Most suppliers use independent, exclusive distributors
  - Distributors offer local inventory, bundling of related products (ductwork, piping, etc.), training, technical expertise, delivery, and sometimes crane rentals
- Lennox Industries sells Lennox brand directly to dealers, Ducane and other brands via intermediaries
  - Believes direct is better suited for higher-end, more complicated products
    - Better able to control quality of customer experience for flagship product line
    - Better training leads to lower warranty claims on direct vs. indirect business
  - SG&A as percent of revenue in direct channel is same as distributor channel margin in indirect channel; direct operating margins higher due to higher-tier mix
- Manufacturers want dealers to be happy because they typically already have a service relationship with consumers, and consumers will take the brands they recommend
- Services typically offered to dealers, either from manufacturer or distributor, include:
  - Intranet with ordering, warranty claims, lead generation and tracking, cooperative advertising fund management, proposal preparation and on-line training functionality
  - Training and certifications
  - Consumer financing (with third parties such as GE Money and Wells Fargo)
  - Technical and application support

### Lessons for Solar

- Exclusive distributors can provide many of benefits of direct sales while allowing bundling of complimentary products in which module manufacturer has little interest

# Summary: Key Takeaways for Solar

---

## 1. Producers should consider working directly with as many dealers as economically feasible

- Solar is a “complicated sale” like generator sets, windows, and some central air systems
- Note: Can use hybrid models like third-party logistics to go “direct” without owning logistics assets

## 2. Exclusive distributorships are worth considering as an alternative to direct relationships

- Avoids manufacturer investment in channel personnel and assets, while aligning interests of channel with those of manufacturer
- Distributor could carry complimentary products in which manufacturer has little interest
  - Inverters, racking, wiring, etc.
- Distributor would appropriately balance investments in inventory, training, and customer service to maximize profit potential of its territory

## 3. In any event, generate preference lower in the distribution chain with “skip level” marketing

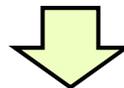
- Training can generate familiarity and goodwill
- Manufacturer-run dealer programs can build dealer preference and stickiness
  - Co-op marketing, lead generation, supply pipeline visibility, application engineering, customer financing (loans, leases, or PPAs), web-based proposal generation, outsourced engineering and drawings

# Appendix

---

# ***Distribution channels provide many services***

<b>Service</b>	<b>Examples</b>
<b>Sales</b>	Sell product to next level in distribution chain or to end customers
<b>Logistics</b>	Move products efficiently from one place to another, sometimes through international borders (customs clearance)
<b>Marketing</b>	Advertising, co-operative ad programs, merchandising in retail stores, etc.
<b>Retail points of presence</b>	Retail stores, showrooms, or design centers
<b>Financing</b>	Credit to customers
<b>Risk assumption</b>	Exchange rates, credit, theft, loss/damage, product liability, etc.
<b>After-sales service</b>	Monitoring, maintenance, and repair; replacement parts sales
<b>Product modifications</b>	Configuration to meet specific customer needs
<b>Warehousing</b>	Storage at place that allows customers easy, quick access
<b>Training and counseling</b>	Train sales force of next level of distribution, or end customers
<b>Monitoring</b>	Monitor channel inventory levels, compliance with merchandising requirements, trans-shipment
<b>Bundling of complementary products</b>	Provide one-stop-shopping, even for components from different manufacturers



**Position each function where it can be done at lowest cost commensurate with customer satisfaction**

## ***For producers, optimal channel design balances five goals:***

---

- 1. Minimize total cost of distribution throughout the channel**
- 2. Maximize producer market share, revenue, and profit**
- 3. Optimize return on distribution-specific assets**
- 4. Meet customer needs**
  - Product information, customization or modification, availability, after sale service, credit, etc.
- 5. Maintain sources of market information**

# ***The relative balance of direct sales vs. use of intermediaries dependent on a number of characteristics***

---

## **Indicative of Direct Sales**

- Highly technical or complex sales
- Extensive engineering involvement
- High customization
- Buyer concentration
- Relatively fewer, higher value transactions
- Geographic concentration
- Low sales expense to transaction value
- Inexpensive to ship (high value-to-weight ratio)

## **Indicative of Use of Intermediaries**

- Commodity sales
- “Off-the-shelf” products
- Buyer fragmentation
- Geographic dispersion
- Low unit value
- Bundled sales
- High level of after-sales service and support
- Relatively many, low value transactions
- Expensive to ship (low value-to-weight ratio)

# ***Type of intermediary used also depends on several factors***

---

- **Manufacturers reps / agents**
  - Same as direct sales, except:
  - Margin insufficient to cover fixed selling costs
  - Direct sales force does not have correct competencies (for example, they sell to OEMs and are not equipped to sell to retail channels)
  - Product line is narrow and benefits from being a part of a broader line
- **Independent, exclusive distributors**
  - High distributor investment required (in inventory, equipment, personnel, or in developing technical expertise)
  - High value of aftermarket, support, or maintenance business
  - Unbundled sales
  - Relatively low producer market share
- **Independent, non-exclusive distributors**
  - Low distributor investment
  - Bundled sales (convenience/one-stop-shopping of premium importance)
  - Relatively high producer market share
- **Captive (producer-owned) distributors**
  - Market information desired
  - In areas where have difficulty maintaining independent distributors
  - Need training ground for producer managers that gives them access to end-customer interaction
- **Brokers**
  - Find buyers (and sellers) opportunistically; many represent different principals in each transaction
  - Often in used when no other distribution in place

# Companies can use a variety of hybrid channel types to provide maximum customer satisfaction at lowest cost

Increasing margin to channel partners 

Service	Direct	3PL*	FD**	Joint Sales	Indirect
Sales	Mfr	Mfr	Mfr	Shared	Distributor
Marketing	Mfr	Mfr	Mfr	Varies	Varies
Product modifications	Mfr	Mfr	Mfr	Varies	Varies
Training	Mfr	Mfr	Mfr	Varies	Distributor
Monitoring	Mfr	Mfr	Mfr	Varies	Distributor
Merchandising	Mfr	Mfr	Mfr	Distributor	Distributor
After-sales service	Mfr	Mfr	Mfr	Distributor	Distributor
Bundling	Uncommon	Mfr	Mfr	Distributor	Distributor
Financing	Mfr	Mfr	Distributor	Distributor	Distributor
Risk assumption	Mfr	Varies	Distributor	Distributor	Distributor
Warehousing	Mfr	Distributor	Distributor	Distributor	Distributor
Logistics	Mfr	Distributor	Distributor	Distributor	Distributor

Examples:	Direct	3PL*	FD**	Joint Sales	Indirect
	<ul style="list-style-type: none"> <li>• Wind / gas turbines</li> <li>• Aircraft</li> <li>• Hot water heaters (retail)</li> <li>• Generac home standby generators</li> <li>• Solar residential (large dealers)</li> </ul>	<ul style="list-style-type: none"> <li>• SunPower residential PV (McCollister)</li> <li>• A.R.I. Flow Control (ProLog)</li> <li>• Crate &amp; Barrel (Exel)</li> </ul>	<ul style="list-style-type: none"> <li>• Nokia China</li> <li>• Motorola China</li> <li>• BD blood collection products</li> </ul>	<ul style="list-style-type: none"> <li>• Cement roof tiles</li> <li>• Residential flooring</li> <li>• Residential load centers (large opportunities)</li> </ul>	<ul style="list-style-type: none"> <li>• Hot water heaters (for contractors)</li> <li>• Solar residential (for smaller dealers)</li> <li>• Residential load centers (most cases)</li> </ul>

Notes: \* Third Party Logistics; \*\* Fulfillment Distribution  
Woodlawn Associates

# ***Manufacturers' ability to build competitive advantage in distribution depends on several key factors***

---

- **Value of business to the reseller**
  - Completeness of manufacturer's product line relative to competitors'
  - Margin product line generates for reseller
  - Value of the installed base (for repairs, maintenance, or parts)
- **Consistency and predictability**
  - Distributors know the rules of the game and believe they will be stable
  - Manufacturer will not "seize" valuable customers for direct sales
  - Manufacturer will not take actions to make short term numbers that erode channel strength
- **Quality of relationship**
  - Reseller-manufacturer relationship is inherently both cooperative and adversarial
  - Both parties want to cooperate to sell more
  - Tension over proper split of channel margin