





Energy Efficient Ventilation with the EnduraMAX™ Direct Drive Fan

Daniel Morehouse
Product Manager



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About Me

Education

- Engineering Major - Penn State University

Career

- Engineer at Chore-Time (2017-2021)
 - Floor Feeding Product Line
 - Additional Projects in Ventilation and Flex-Auger Product Lines
- Product Manager (2021-Present)
 - Broiler Product Lines – Floor Feeding, Ventilation, Watering, Flex-Auger

Hobbies

- Reading, Music, and Travel



Energy Efficient Ventilation



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Global Energy Market Overview

Understanding Basics of Poultry House Ventilation

Benefits of Direct Drive Fans and Variable Speed

Challenges to Overcome as an Industry

Case Studies and Current Results

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Global Energy Market Outlook

- Power usage is becoming increasingly important in the Poultry Industry
 - Climate Control
 - Lighting
 - Controls
 - Water Pumps
 - Feed Handling
- Important to understand Energy Market in your country or region
 - Self-Sufficient?
 - Reliant on Import of Natural Resources?
 - How is the electricity generated in your region?

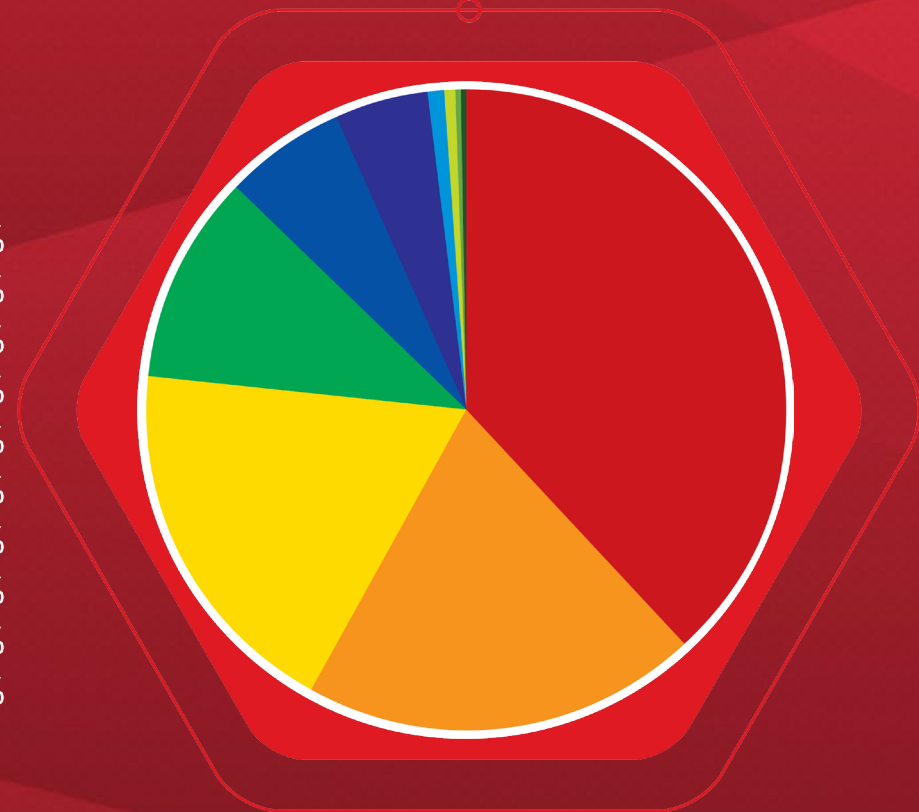


USA Electricity Market

- Natural Gas and Coal – Provide nearly 60% of US Electricity
- Globally there has been a push for moving to renewable sources of electricity
- Economic factors have slowed down the process of converting to renewable sources resulting in power insecurity
- Continued reliance on Supply-Chain of natural resources for electricity

SOURCES OF US ELECTRICITY

■ Natural Gas	38.32%
■ Coal	19.85%
■ Nuclear	18.60%
■ Wind	10.47%
■ Hydro	6.14%
■ Solar	4.90%
■ Biomass	0.64%
■ Oil	0.54%
■ Geothermal	0.40%
■ Other Fossil	0.15%



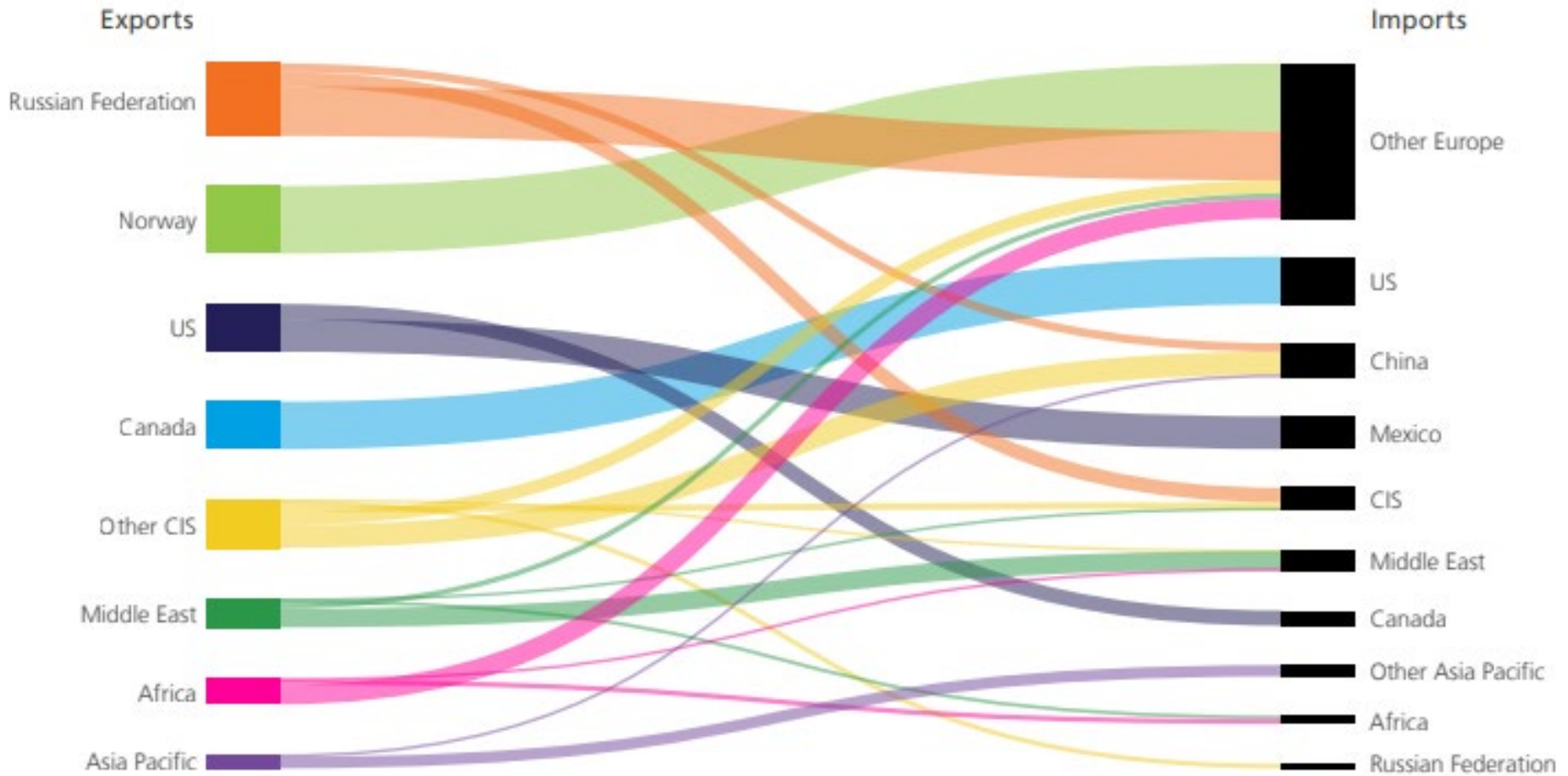
Global Energy Market Outlook

- Global Events impact Energy Markets
 - Ukraine War - Natural Gas and Coal prices record highs
 - Unease in Middle East
- Significant interdependence of Energy Sources
 - The Energy Market is an Intricate Web of Global Supply Chains



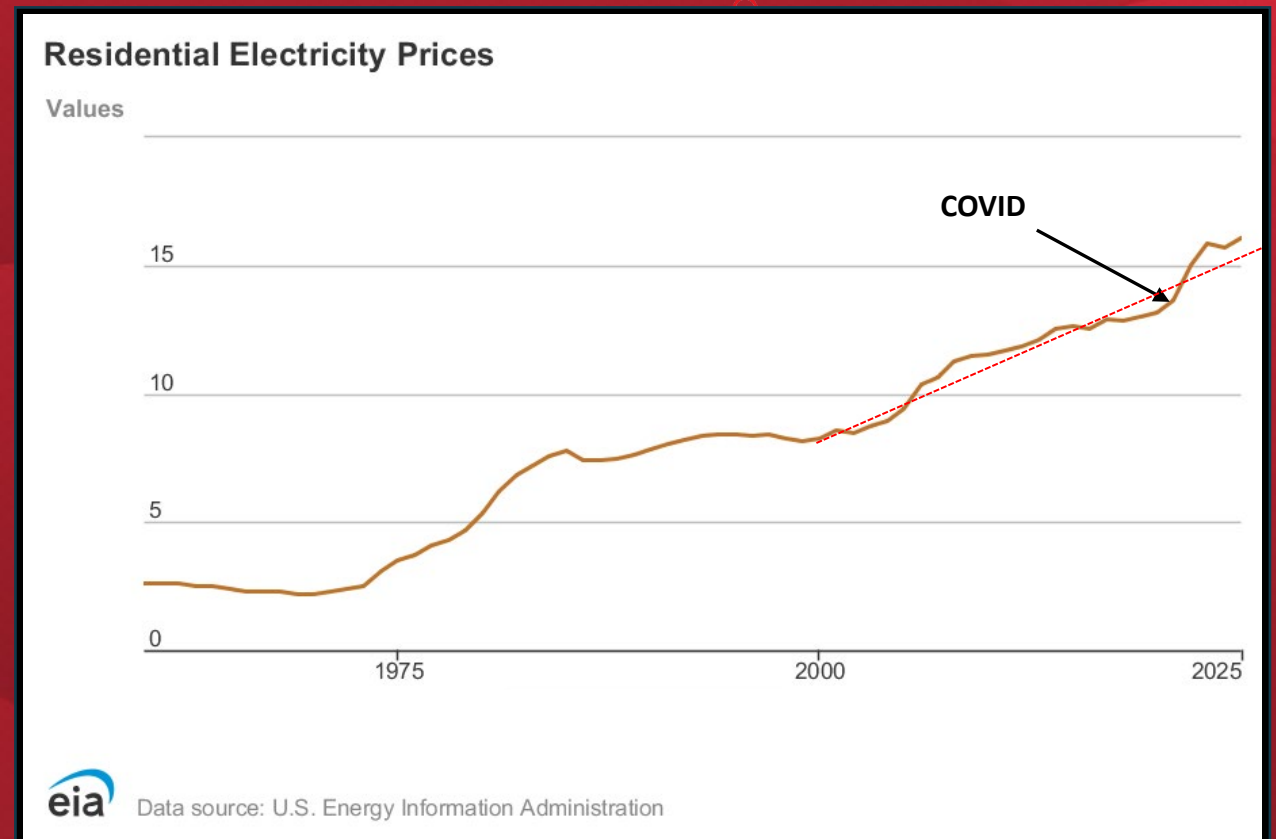


Natural gas Major trade movements 2022 – pipeline



Electricity Price Trend

- Electricity prices have steadily risen for decades
- 1994-2000 (8.40 to 8.24)*
 - Only time since 1970 price did not rise in a 5-year block (2021 – 8.58)
- * *Per EIA Annual Average Residential Electricity Price Data*
- Need to continue to innovate ways to reduce impact of electricity prices



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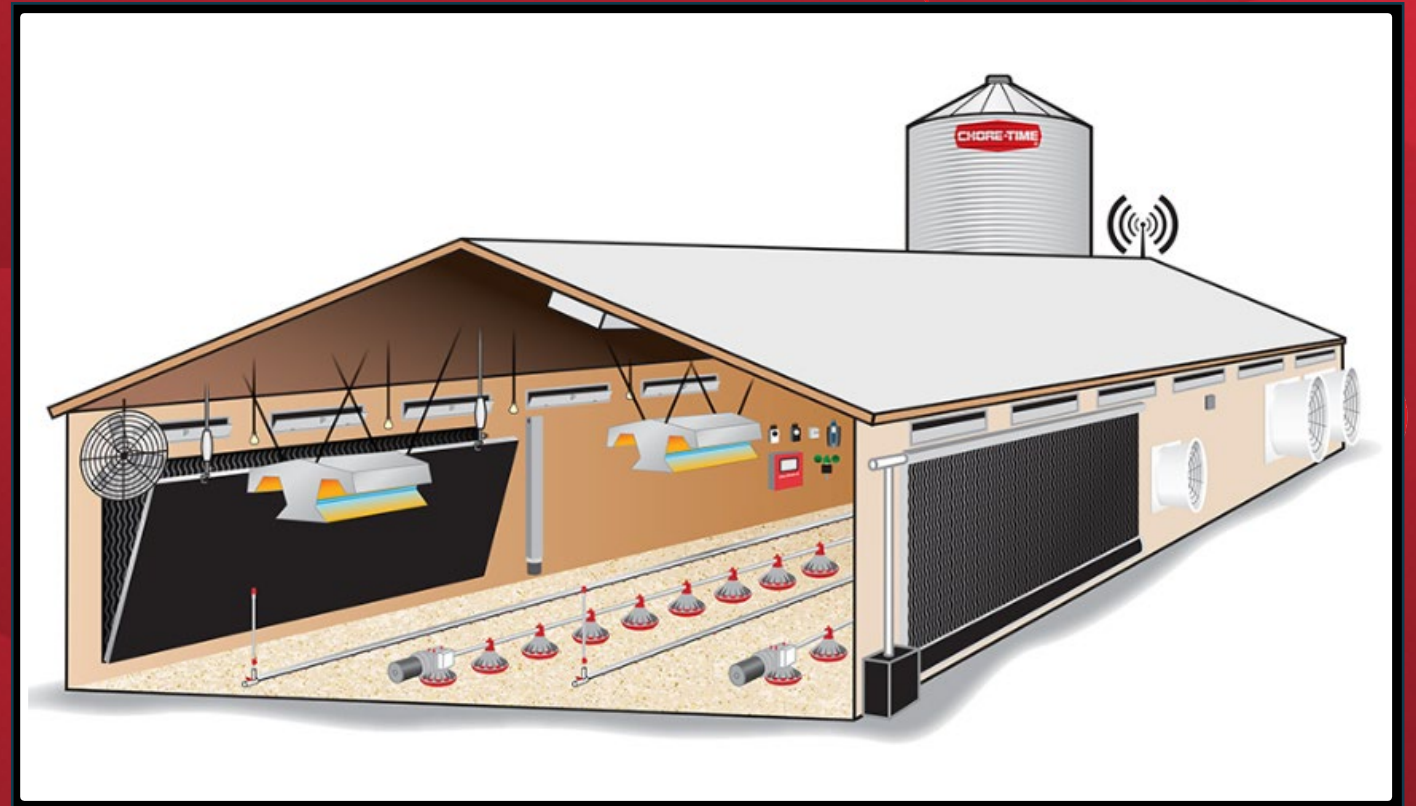
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Poultry House Ventilation Overview

- Main Objectives:
 - Supply fresh air
 - Regulate temperature
 - Regulate humidity
 - Reduce air contaminants in the poultry house



Poultry House Ventilation

- Too little ventilation can lead to:
 - Increased CO₂
 - Increased Temperature
 - Increased Moisture
 - Increased Ammonia
 - Excess Dust and Particles



Poultry House Ventilation

- Too much ventilation can lead to:
 - Cold Birds
 - Energy Waste
 - Excessive Wear on Fans and Winches
- Important to ensure proper house configuration for proper ventilation



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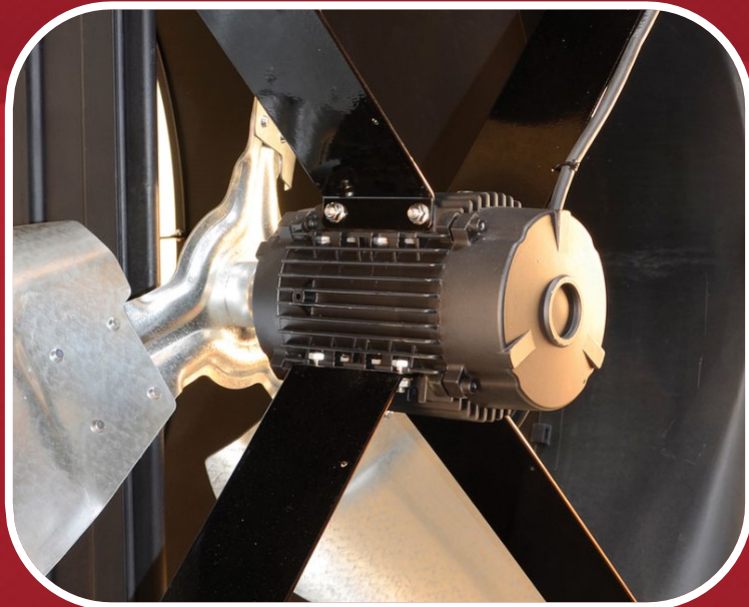
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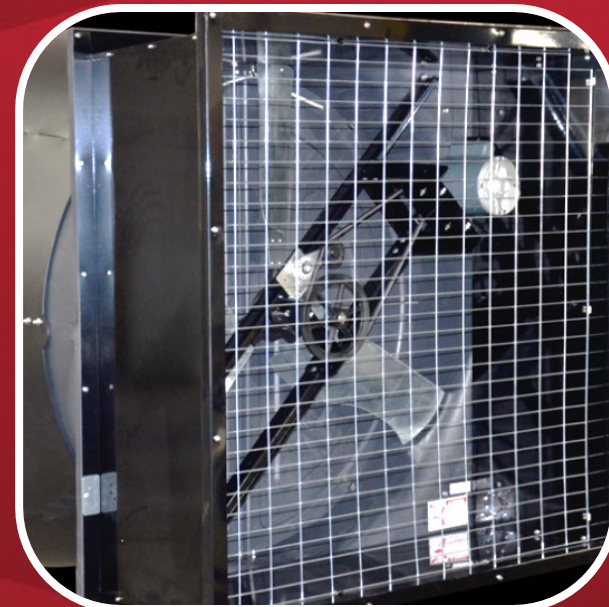
Direct Drive vs. Belt Drive

Direct Drive: Fan Blade is attached directly to the shaft of the motor



EnduraMax™ Direct Drive Fan

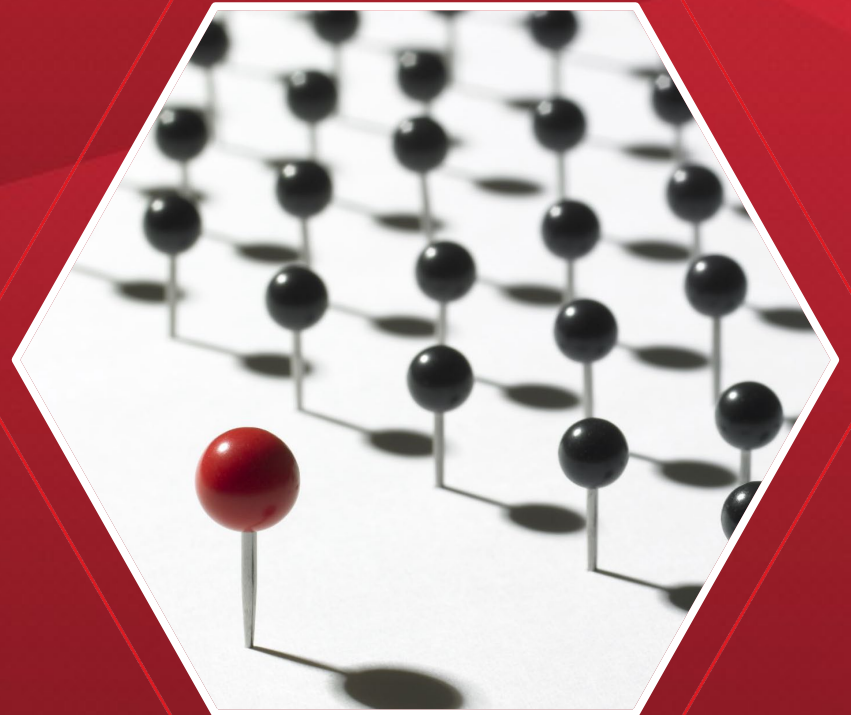
Belt Drive: Fan Blade is attached to a system of pulleys and bearings to get power from the motor



Endura 57" Belt Drive Fan

Direct Drive Motors Stand Out

- Direct Drive motors do not have performance losses due to:
 - Belt Slip
 - Worn Belts
- Direct Drive motors tend to be more efficient
- Direct Drive Fans tend to be quieter than Belt Drive Fans



Advantages of Direct Drive All Variable Speed Fans

Lower Maintenance

- Eliminate high-wear parts that require regular maintenance and replacement
 - Belts
 - Pulleys
 - Bearings

What does this translate to for the grower and integrators?



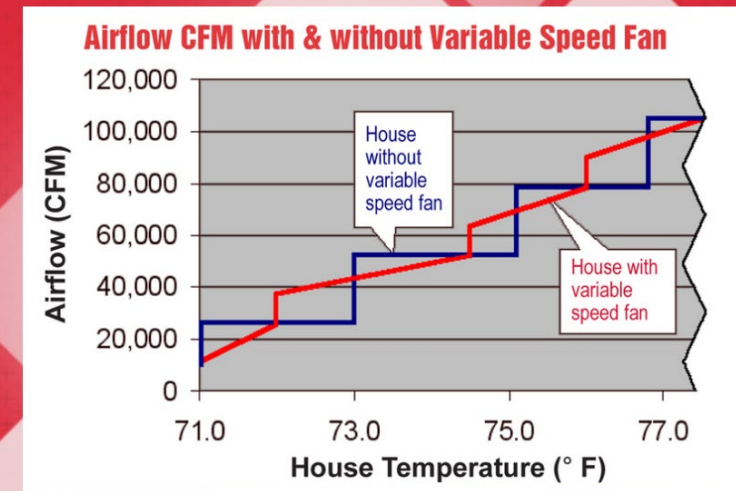
Advantages of Direct Drive All Variable Speed Fans

Saves TIME
+
Saves MONEY



Variable Speed

- Ability to run fans at different speeds
- More control over airflow and temperature
- Lower speeds have higher efficiency
- Quieter fan operation at lower speeds
- CHORE-TRONICS® Control adjusts fan speed automatically



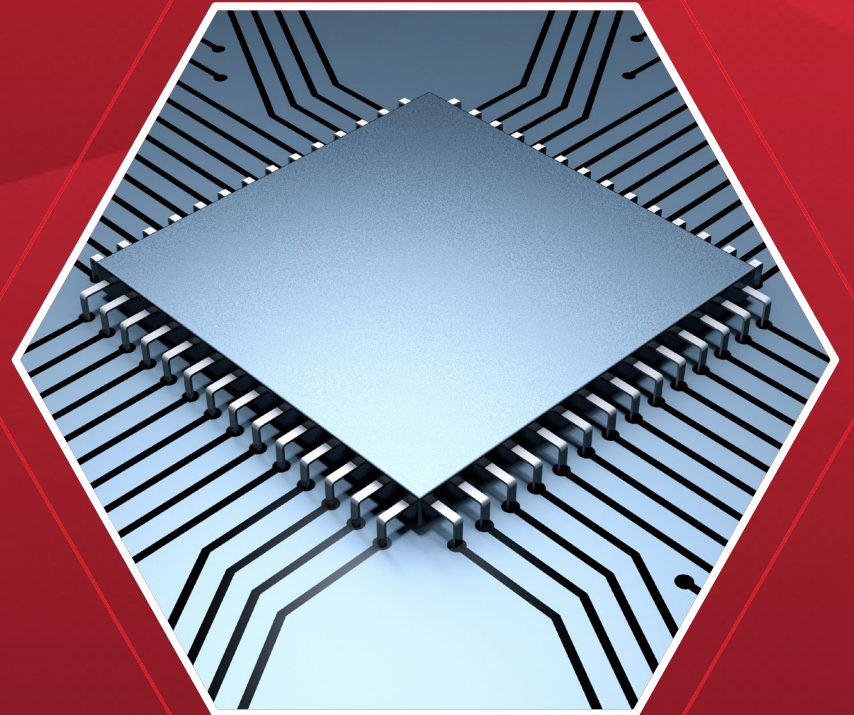
Energy Savings

- No performance lost due to belt slip
- More Efficient motor design
- Variable Speed lets fan run near “Energy Efficient Sweet Spot” more often
- Higher Max CFM with EnduraMax™
 - Achieve same CFM as Belt-Drive fans at less than 100% speed



Simplicity of Use – EnduraMAX™

- When combined with Chore-Tronics Catalyst, the “thinking” is removed from the equation
 - New growers do not need extensive knowledge on ventilation schemes to be successful
 - More time to focus on optimizing other areas of management knowing ventilation is being optimized for you



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Overcome Past Reputation?

- Motors in initial push for Direct Drive fans were not always reliable (early ~2000's)
- Technology has changed tremendously over the last few decades
- Direct Drive Motors and VFD's are now very reliable and used regularly
 - Washer/Dryer motors



Too Expensive?

- Higher cost than comparable Belt-Drive Fan
- Understand the Value Proposition of Direct Drive Fans
 - Higher Performance (Max CFM/Fan)
*Specific to EnduraMax™
 - Variable Speed
 - Energy Savings
 - Lower Maintenance
- Put a dollar figure next to energy savings based on individual situation
- State and government subsidized programs



Too Confusing?

- Unsure how to manage Direct Drive Fans
- Fear of Unknown
- People with no experience using Direct Drive fans *assume* the types of problems that *could* come up
- Educate ourselves and our customers
- In-person training
- Web tutorials
- Industry presentations/workshops
- Continue to get Direct Drive fans into the field to gain real data



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Case Study

- Grower in the Southeast USA
- Not a research comparison
 - Real application, growing birds for an integrator
- Note 14.2 cents electricity prices
- Houses using CHORE-TRONICS® Controllers



Flock no.	Start	End	Power used (kwh)		% power savings	\$ savings*
			Hs 1 DD fans	Hs 2 BD fans		
1	01/13/23	02/09/23	1,651	2,776	41%	\$ 159.75
2	03/11/23	04/10/23	3,056	4,911	38%	\$ 263.41
3	04/27/23	06/08/23	5,051	7,906	36%	\$ 405.41
4	06/29/23	08/08/23	8,293	12,276	32%	\$ 565.59
5	09/05/23	10/16/23	4,459	7,641	42%	\$ 451.84
6	11/10/23	12/20/23	831	1,506	45%	\$ 95.85
Totals			23,341	37,016	37%	\$ 1,941.85

* electricity cost is \$.142/kwh





THANK YOU



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