

# *Can You Turn Your Green Conveyor And Sortation Initiatives Into Greenbacks?*

Sponsored by:



Presented by:

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# Introduction

- Del Deur, TGW
- Tim Kraus, Intelligrated
- Can going green save you green?
  - Conveyor & sortation equipment update
  - System design update
  - Regulatory update

# “Green” Sortation and Conveyor?



- Material Handling with minimal environmental impact in terms of
  - Energy use
  - Material use
  - Negative human impact
- Good Environmental Policy, but does “Going Green” always cost more?
- Does it pay off? Can we make a business case for it?



# “Green” Equipment Update



# “Greenest” Sortation Conveyor?



Narrow Belt Sorter



Pop up wheel belt sorter



Shoe Sorter

- Consider Energy When Evaluating Sortation Options
  - Many sortation technologies overlap in application
  - Each technology has pros and cons. Also consider energy use
  - Remember that lower maintenance and lower noise are also “green”
- Narrow Belt Sorter - Example
  - Uses 40% of the energy of a Pop Up Wheel Belt Sorter
  - Uses 60% of the energy of a Shoe Sorter
  - Same cost as the Pop Up Wheel Belt Sorter, 60% of a Shoe Sorter
  - \$1,900 annual savings from smaller motor
    - 3 HP motor vs. a 7 ½ HP with 24/7 operation at \$.07 kW/hr.
  - Less materials, lower maintenance and lower noise



# “Green” Conveyor Product Options – Energy Efficient Motors



- Electricity costs account for 95% of total lifetime cost of conveyor systems
  - High energy efficient motors
    - Motor efficiency is the ratio of electrical input power vs. mechanical output power
    - Package conveyor motors - 80% to 90% efficiency
    - Most motor suppliers offer a “premium” efficiency option
      - “Premium” efficiency motors can boost efficiency 3% to 5%
      - 4% increase in motor efficiency = \$53 annual savings per 3HP motor on a 24/7 operation at \$.07 kW/hr
      - Soft savings of better motor construction = longer motor life
      - 2 to 3 year payback on a 24/7 operation

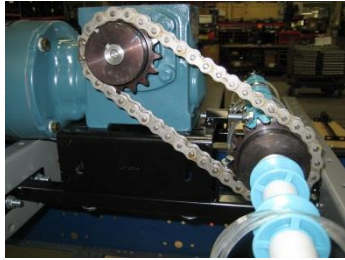
# “Green” Conveyor Product Options –

## Helical Gear Reducers

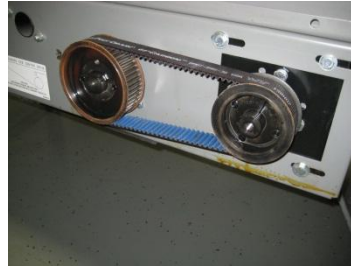


- Worm gear reducers - historical industry standard
  - Low cost, but only 65% to 80% efficiency
- Helical gear reducers growing as an energy efficient standard or option
  - 95% to 97% efficient dependent on gear sets
  - 15% increase in reducer efficiency = \$200 annual savings per motor on a 3 HP motor in a 24/7 operation at \$.07 kW/hr
  - One to two year payback in many applications

# “Green” Conveyor Product Options – Final Drive Consideration



Chain drive



Belt Drive



Direct drive eliminates chain and belts

- At least 4% of energy is lost through a chain or belt drive
  - Up to 10% can be lost on a poorly maintained chain drive
- Direct drives couple reducer directly to the shaft
  - 4% to 10% increase in efficiency = \$53 to \$132 annual savings per motor
    - 3 HP motor in a 24/7 operation at \$.07 kW/hr
  - No chain maintenance and related downtime
  - Two to three year payback



# “Green” Conveyor Product Options – Motor Driven Roller (MDR)



- Most users love MDR conveyor except for the high initial cost
  - In straight accumulation runs, MDR is twice the cost of belt accumulators
  - In areas with transfers, merges or short conveyor runs, MDR is equal or less than belt conveyor
  - Consider a “hybrid” system
    - Use **both** MDR and traditional conveyor technology in the same system for low cost and energy/maintenance savings





# Ask the Questions

When purchasing conveyor being “Green” can mean savings and profits for you



- ASK – Sorters
  - Are there multiple sortation technologies choices for this application?
  - Pros and cons comparison **including** energy use
- ASK – Conveyor drives
  - Is an energy efficient motor an option?
    - Helical gear reducers? Direct drives?
- ASK – Hybrid MDR Conveyor Systems
  - Are there areas where MDR conveyor makes sense?
  - Can you quote those areas with MDR?



# “Green” Systems Design







# “Green” Systems Design

- Turn Off

- Electric motors consume 60-70% of all electricity in the US
- Best way to reduce usage is to turn things off
  - “Sleep mode” during period of inactivity
  - “Sleep mode” during planned inactivity
  - Makes sense for pick modules, sorters, aftersort lanes

10% off time for a  
standard motor

=

Premium efficient  
motor energy savings





**SLOW**

# “Green” Systems Design

- Slow Down
  - Reduce gaps to sort the same amount of cartons at lower speeds
  - Utilize multi-speed system operation to run faster when needed



## Real world example

- Existing system was running a sliding shoe sorter at 540 fpm with 14” gaps between 18” average cartons
- Reducing gaps to 6” allowed for a reduction in speed to 400 fpm while producing the same throughput

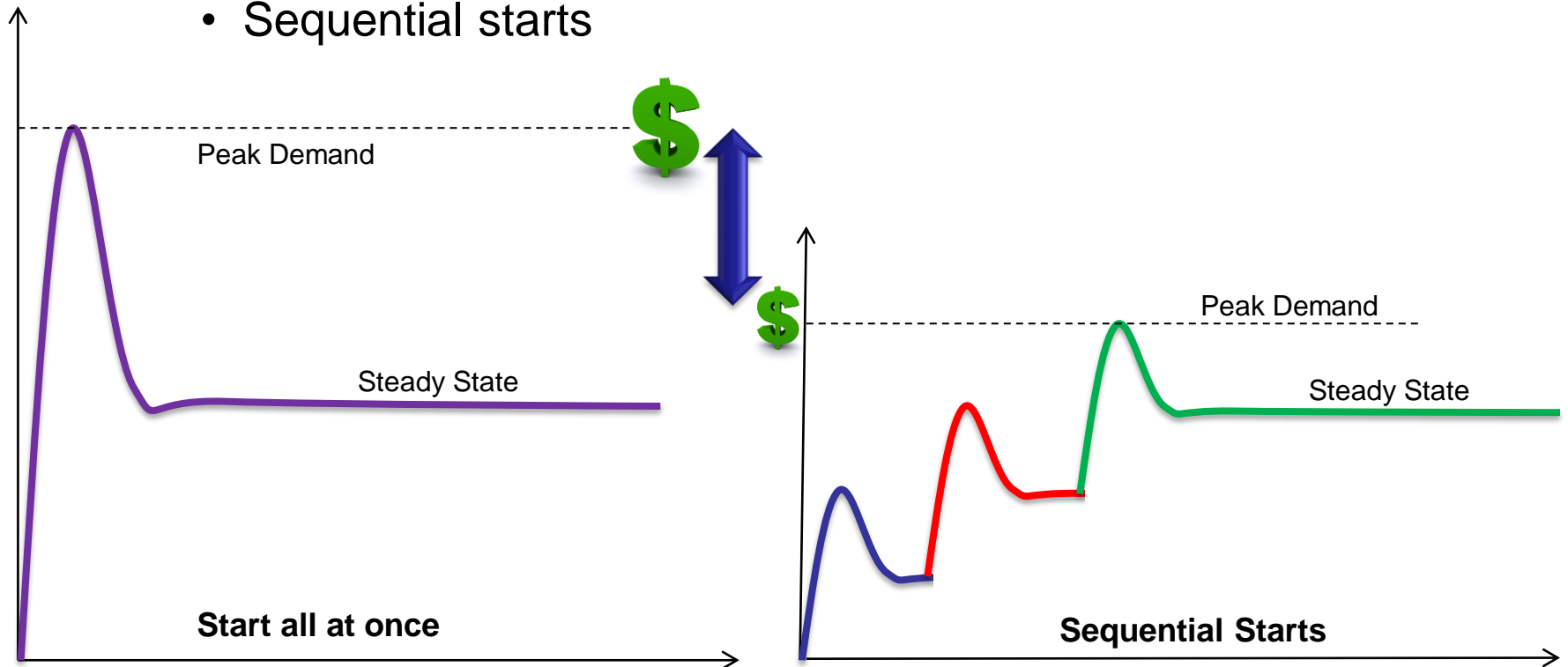
## As a result

- 23% reduction in energy usage
- 25% increase in expected equipment and critical component life
- 3 dBA reduction in operating noise levels
- Opportunity for a 34% increase in system volume to handle business fluctuations



# “Green” Systems Design

- Reduce the Peak
  - Energy rates typically based on peak demand
  - Find ways to trim the peak demand
    - Sequential starts

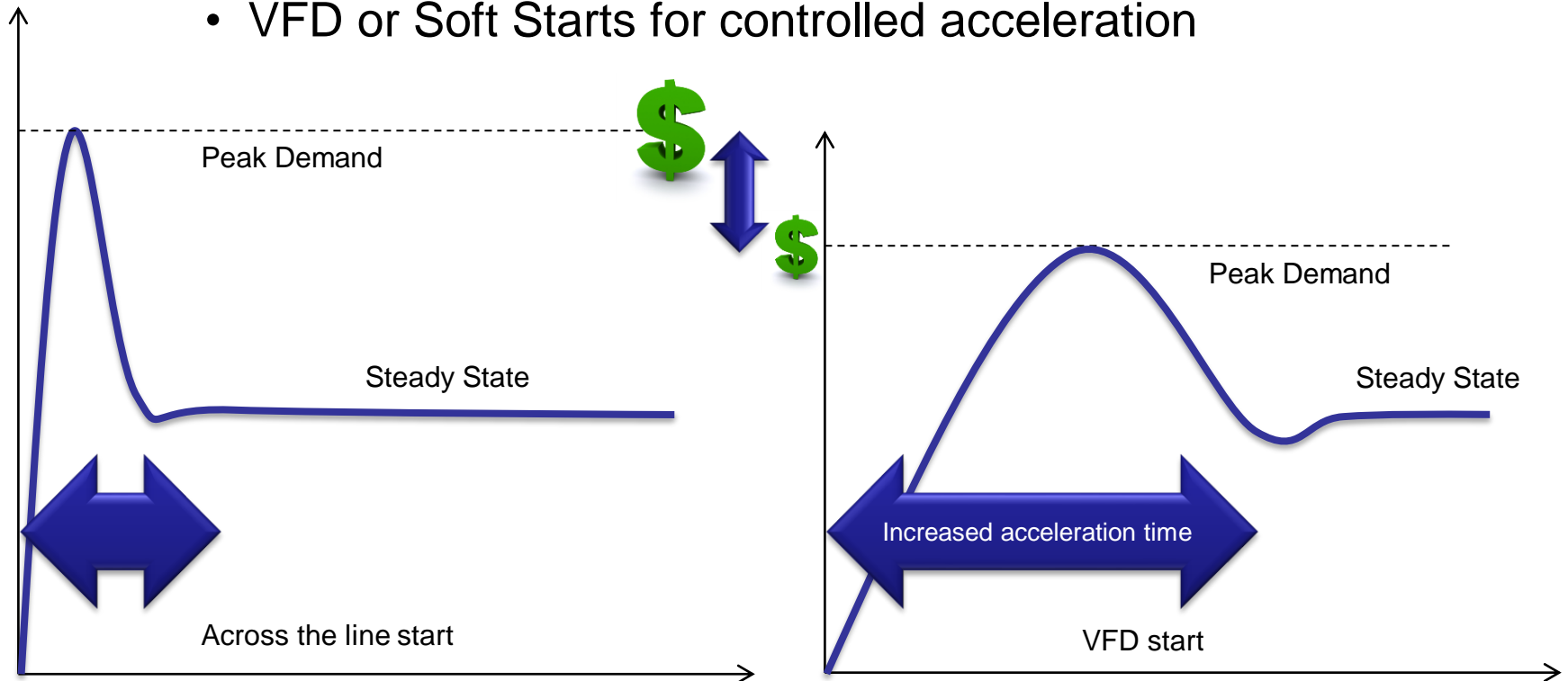






# “Green” Systems Design

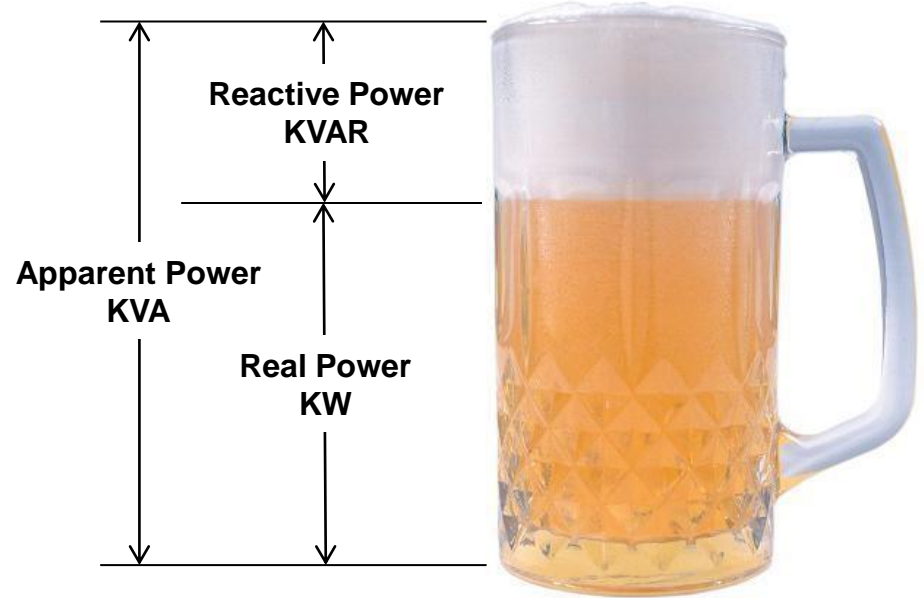
- Reduce the Peak
  - Energy rates typically based on peak demand
  - Find ways to trim the peak demand
    - VFD or Soft Starts for controlled acceleration





# “Green” Systems Design

- Improve your **Power Factor**
  - *What is Power Factor?*



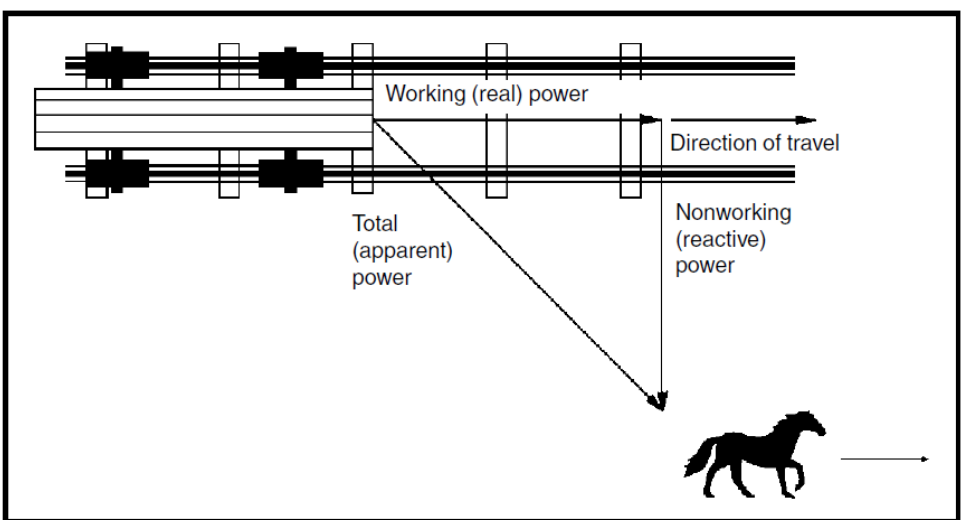
$$\text{Power Factor} = \frac{\text{Real Power (KW)}}{\text{Apparent Power (KVA)}}$$

Improve Power Factor by reducing the foam



# “Green” Systems Design

- Improve your **Power Factor**
  - *What is Power Factor?*



$$\text{Power Factor} = \frac{\text{Real Power (KW)}}{\text{Apparent Power (KVA)}}$$

Improve Power Factor by reducing the angle of pull





# “Green” Systems Design

- Why improve your power factor?
  - Utility bill will be smaller
    - Most charge penalty fee for power factors less than 0.95
- Ways to improve your power factor
  - Power factor correction
    - Install capacitors to reduce the magnitude of reactive power
  - Use energy efficient motors
  - Use motor sizes near capacity



# “Green” Regulatory Update



# “Green” Regulatory Update

## LEED Certification

- What is LEED Certification?
  - Leadership in Energy and Environmental Design
  - Voluntary, consensus-based, market driven program that provides third party verification of green buildings
- LEED Certification benefits
  - Lowers operating costs
  - Increases asset value
  - Qualify for tax rebates (varies by locale)
  - Qualify for zoning allowances (varies by locale)





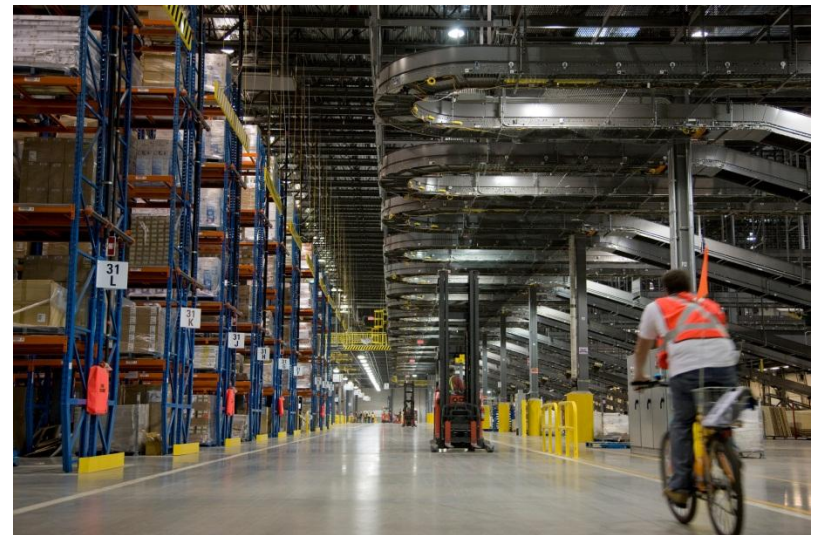
# “Green” Regulatory Update

## LEED Certification

- How does this relate to conveyor and sortation systems?
  - LEED Certification requires certain min requirements, examples:
    - EAp2 – Minimum energy performance, required
    - EAp3 – Building level energy metering, required
  - Level of Certification based on accumulated credits, examples:
    - EAc3 – Advanced energy metering, 1 point
    - EAc2 – Optimize energy performance, up to 18 points

### Example:

Proving a 20% energy performance improved design can earn 8 points



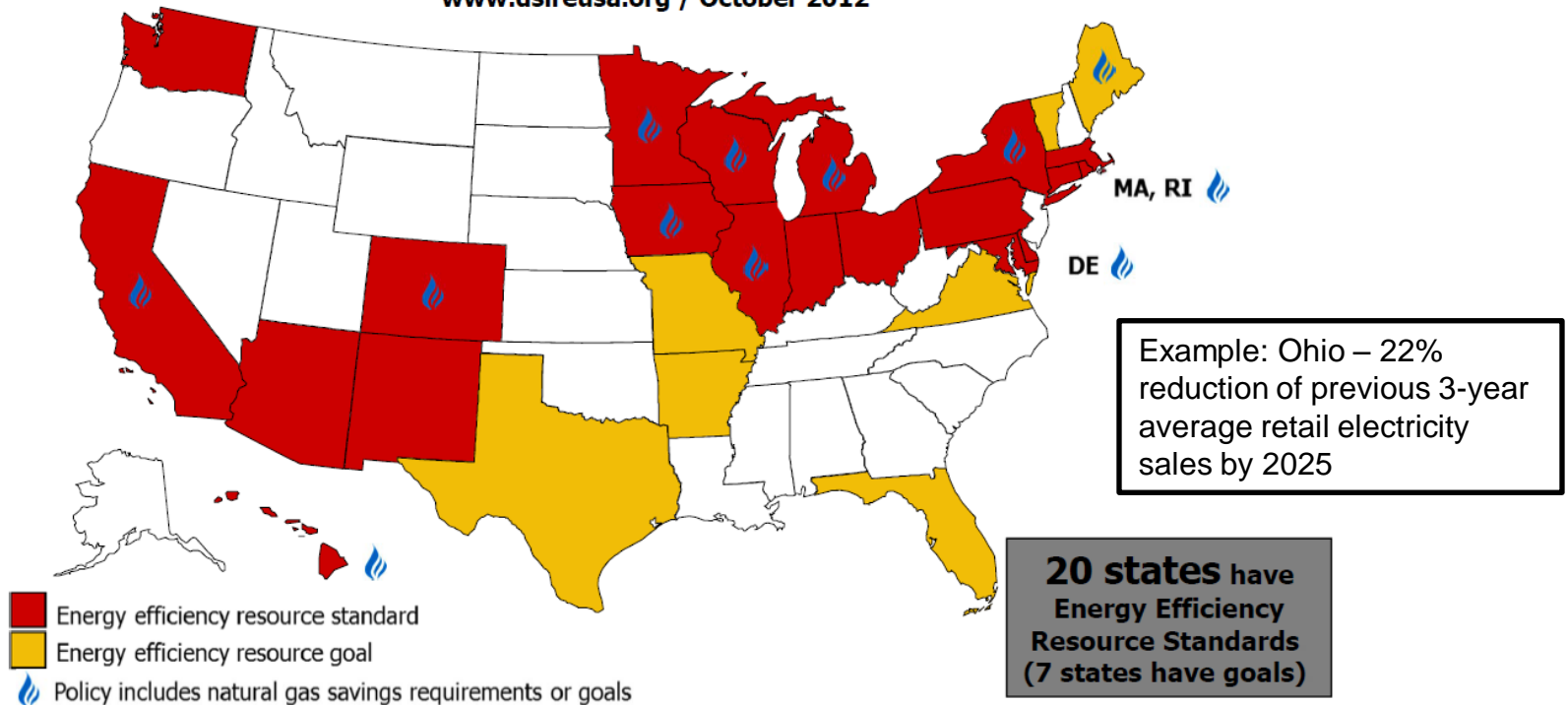


# “Green” Regulatory Update

- Energy efficiency resource standards (EERS) are state policies that require utilities to meet specific targets for energy savings according to a set schedule

## ***Energy Efficiency Resource Standards***

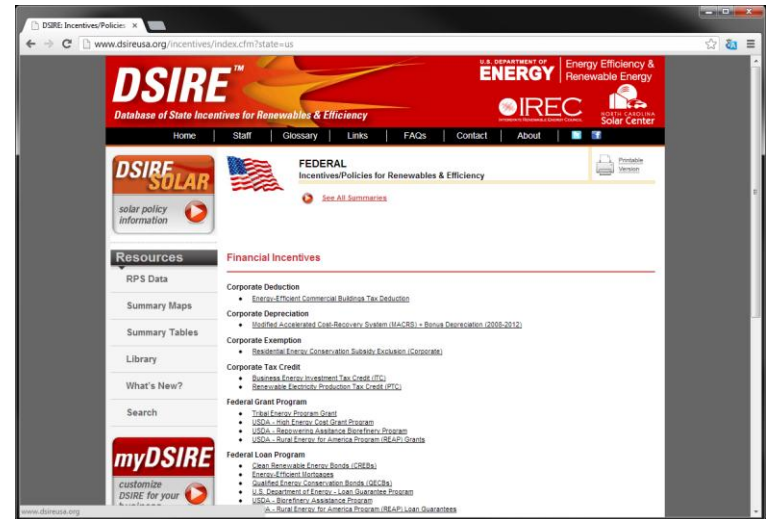
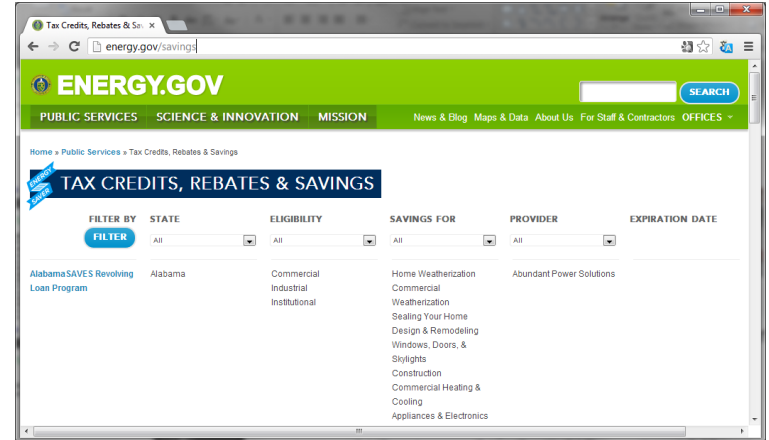
www.dsireusa.org / October 2012



Note: See following slide for a brief summary of policy details. For more details on EERS policies, see [www.dsireusa.org](http://www.dsireusa.org) and [www.aceee.org/topics/eers](http://www.aceee.org/topics/eers).

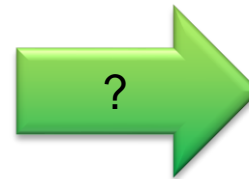
# “Green” Regulatory Update

- Tax benefits available
- Vary widely by locale
  - <http://energy.gov/savings>
  - <http://www.dsireusa.org>



# “Green” Summary

- Can you turn green conveyor and sortation initiatives into greenbacks?



- YES!
  - Energy efficient equipment choices can provide **paybacks**
  - Energy efficient system designs can provide **paybacks**
  - Regulatory changes are encouraging energy efficient implementations and help provide **paybacks**

## *For More Information:*

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[www.MHI.org/CSS](http://www.MHI.org/CSS)