Improving water and energy efficiency and finding cleaner sources of energy are critical to meeting our sustainability goals!

Over the years, the global food system has brought nutrition, economic opportunity, convenience, and enjoyment. Today, however, the global impacts of climate change, soil erosion, water scarcity, and population growth bring challenges that threaten its ability to meet our needs. The food system is in urgent need of transformation.

70% of the world’s fresh water use is in agriculture alone

Only 14% of plastic packaging is recycled for future use

1/3 of greenhouse gas emissions originate in the food system
Energy, Water, & Waste Sustainability in Food Manufacturing

Energy Efficiency
Alternative sources – biomass, thermal vs electric, solar/renewables
GHG & Efficiency Profile of various energy sources (e.g. compressed air vs electric)
Base cost to operate
Resiliency – grid outages

Water use efficiency
Plant operation
Processing and Packaging
Stewardship & Advocacy
Adoption of AWS Standard
Replenishment of water used

Reduced waste = reduced energy & water
Zero Landfill
Recyclable materials
Reduce packaging
Base business practice
## Success and Design Criteria of Solutions

### Our Energy Priorities:
- Cost to Operate
- Energy Efficiency
- Climate Impact
- Resiliency/Reliability

### Snacks Scale:
- ~40 Plants in US+Canada
- ~200 production lines

### Success and Design Criteria

<table>
<thead>
<tr>
<th>TECHNOLOGY</th>
<th>PRACTICES/PROGRAMS/POLICY</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Retrofittable</td>
<td>• Executable</td>
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<tr>
<td>• Scalable</td>
<td>• Cost effective</td>
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<tr>
<td>• Must provide a positive ROI</td>
<td>• Clear connection to goals &amp; results</td>
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<tr>
<td>• Maintainable</td>
<td>• Consistent with values and overall strategy</td>
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<tr>
<td>• Reliable</td>
<td>• Inspirational</td>
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<tr>
<td>• Measurable/verifiable impact</td>
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**Consistent with product design, quality, capacity, and food safety imperatives**

**Meets all personnel safety and operational risk needs**
Technology Development Process

Ideas meeting go-forward criteria & priority

Pilot test
Usually Full Scale, single site
Evaluate/confirm performance, savings, reliability, etc.
1mo – 2 yrs

Scale-up/replication
# sites depends on economics and impact on goals
Timing dependent on resourcing and priority

Plant Personnel
R&D
Suppliers
NGOs/Labs
Online
Industry
Operations Supply Chain Climate/Energy Approach

Base Efficiency
- Thermal Insulation
- Heat Recovery
- Practices: Optimized Operation, Best Practice Replication, Ownership
- Conventional Automation
- LED Lighting
- Waste Reduction
- Fleet: lightweighting, aerodynamics, driver training

~90% penetration

Technology
- Renewable Generation (solar)
- Biomass Boilers
- Advanced Lighting Controls
- Advanced Combustion Tech.
- Dashboarding and Analytics
- Fleet: Electric and CNG alternative fuels

~25-50% penetration

Emerging/Evolving Opportunities
- Predictive Performance Mgmt - AI/Machine Learning
- Industrial IoT
- Microgrids/Energy Resiliency
- Electrification of thermal loads
- “Campus” strategy vs individual tactics
- Further Renewable Fuels

~5-10% penetration

Obstacle/Need: Finding &/or developing technology that can help us on our climate journey while providing an acceptable return on investment. (Scope 1&2 GHG)

Main Opportunity on snacks is in thermal processing and waste heat capture.
Climate & Energy - Results

PEPSICO IS EMBRACING RENEWABLE ELECTRICITY AROUND THE WORLD:

- **USA**: Transitioning to 100% renewable electricity in U.S. direct operations in 2020.
- **EUROPE**: Currently using 100% renewable electricity in 9 European countries.
- **MEXICO**: Sourced 65% of electricity needs from wind energy at PepsiCo Foods Mexico in 2019.

In early 2020, we signed the UN’s **Business Ambition for 1.5°C pledge**, underscoring our commitment to science-based target setting.

Over the life of our Frito-Lay electric vehicle fleet, we will have **driven 12 million all-electric miles**.

PepsiCo **reduced absolute GHG emissions by 6%** across our value chain in 2019, progress toward our goal of 20% by 2030.