Sustainability and Flexible Packaging

More value. Less waste.

www.flexpack.org
Less waste in the first place®
The life cycle attributes of flexible packaging demonstrate many advantages across numerous packaging applications. Flexible packaging starts with less waste in the first place, greatly reducing landfill discards. Innovation and technology have enabled flexible packaging manufacturers to use fewer natural resources in the creation of their packaging, and improvements in production processes have reduced water and energy consumption, greenhouse gas emissions, and volatile organic compounds. Even more, lighter-weight flexible packaging results in less transportation-related energy and fossil fuel consumption and environmental pollution. For today’s needs – and tomorrow’s – flexible packaging is a wise choice.
Enhancing the quality of life
Consider the many ways flexible packaging enhances our quality of life: Flexible packaging increases free time by facilitating easy-to-prepare and microwavable meals. It provides peace of mind through innovative materials that help assure freshness and safety in the items we buy. It reduces the weight of the contents in our shopping bags, as well as the amount of household packaging waste (and landfill consumption). Further, flexible packaging offers very high BTU fuel content for communities where waste-to-energy programs are available, reducing dependency on other energy resources. These facts, plus the environmental considerations mentioned previously, make flexible packaging a true friend in your home and community.

www.flexpack.org
Efficiencies reduce waste and cost

The concept of sustainability recognizes the importance of a thriving economy. Flexible packaging proves its worth and its value for businesses, as well as consumers and the environment. With flexible packaging, converters, manufacturers, shippers, and warehouse personnel gain more cost-efficient production and handling. Retailers benefit from tighter, more eye-catching shelves, with products delivering longer shelf life. Transparent collation films reduce the need and cost of printing on secondary packaging and efficiently combine shipping and retail packaging reducing back-of-store waste. Flexible packaging can also provide traceability and brand protection reducing potential losses. More value with less packaging – that’s what the innovations of flexible packaging consistently deliver in the drive for sustainability.

www.flexpack.org
Coffee Brick Packs Conserve Resources and Landfill Space

Traditionally packaged in metal cans, technology advances have now created flexible structures such as the brick pack for coffee. Among many advantages, these innovative packages:

• contain 88% less packaging by weight compared to metal cans¹
• reduce weight of waste to landfill by 72% vs. metal cans (taking recycling rates of cans into account)²
• use 20% less space in shipping than cans²
• offer energy savings equivalent to 17,200,000+ gallons of gasoline per year in manufacturing and transportation (by changing all steel can coffee packaging to flexible brick packs)²

The potential for reducing actual petroleum use by reducing package weight in transport is even more impressive! Go to www.flexpack.org for all of the details on this and other comparisons and successful solutions for sustainable packaging.

www.flexpack.org

¹Calculations compare 422.38 g total weight metal can with plastic lid (326 g of contents) versus 337.33 g total weight “brick pack” (326 g of contents)
²The ULS Report, February 2007, Coffee Conundrum Case Study
Flexible Mailers Reduce CO₂ Emissions and Fuel Consumption

The manufacturing of flexible plastic mailers contributes much less CO₂ to the atmosphere than mailers manufactured with alternative materials. Additionally, the lower weights of flexible mailers reduce mailing costs and enable greater fuel efficiency in transportation costs, thus reducing fossil fuel consumption. Here are some of the facts:

- Paperboard mailers produce 7.5 times more landfill waste by weight per 100 g of shipped product than flexible pouch mailers produce.¹
- The flexible pouch mailer uses 1/8 the amount of packaging per 100 g of product shipped than the paperboard mailer.²
- Using a flexible pouch mailer reduces shipping weight by 0.19 lbs resulting in $3.38 decrease in delivery costs for FedEx Standard Overnight® than the use of the recycled paperboard mailer³

For a detailed look at these comparisons, visit www.flexpack.org.

¹Landfill waste data source: The ULS Report, February 2007 (assumes a 12% recovery rate of paperboard)
²Product weight assumption: 100 sheets of 24 lb 8.5” x 11” copy paper
³FedEx® mailing assumptions: 1.0 lb product without packaging mailer (mailer weight added for cost estimate), residential address ship from ZIP code 21202 (Baltimore) to 60602 (Chicago), declared value $10.00, FedEx Pak package type, based on FedEx.com rate finder 9-10-07. FedEx and FedEx Standard Overnight are registered trademarks of FedEx Corporation.
Innovations Add Convenience to Sustainable Packaging

Representing one of the best sustainable solutions for packaged rotisserie chicken available in the market today, the Hot N Handy® Rotisserie Pouch is a flexible, all-in-one package that gives consumers convenient, value-added features like a built-in-handle for easy carrying, a resealable zipper, and a slim profile for saving leftovers. The package is also leak resistant and microwave ready. Compared to rigid containers, the flexible packaging pouch:¹

- uses 88% less fossil fuel to produce
- produces 85% less CO₂ emissions during the manufacturing process
- offers a 66% reduction in solid waste

For more details, please visit our web site, www.flexpack.org

¹Data based on 2007 Life Cycle Analysis testing by Robbie Manufacturing, Inc., conducted using SimPro 7.1 LCA Software. For more information on the Hot N Handy® Pouch, visit www.robbiemfg.com. Hot N Handy is a registered trademark of Robbie Manufacturing, Inc.
THROUGHOUT ITS LIFE CYCLE, FLEXIBLE PACKAGING PROVES ITS USEFULNESS AND ITS VALUE FOR BUSINESSES, CONSUMERS, THE ENVIRONMENT, AND FUTURE GENERATIONS. INNOVATIONS IN FLEXIBLE PACKAGING HAVE INCREASED PRODUCT PROTECTION AND CONSUMER CONVENIENCE, ENHANCED RETAIL SHELF IMPACT, AND IMPROVED MANUFACTURING EFFICIENCIES – ALL WHILE USING LESS PACKAGING AND LESS NATURAL RESOURCES AND CREATING LESS WASTE. USING INNOVATIVE FLEXIBLE PACKAGING IS AN EXCELLENT, SUSTAINABLE CHOICE THAT OFFERS MORE VALUE FOR EVERYONE – TODAY AND TOMORROW.

www.flexpack.org

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Sustainability Solutions

Examples of the Environmental Advantages of Using Flexible Packaging
More value.
Less waste.
FLEXIBLE PACKAGING OFFERS REAL VALUE AND SUSTAINABLE BENEFITS TO CONSUMER PRODUCT MANUFACTURERS, RETAILERS, AND CONSUMERS THROUGH INNOVATION, SOURCE REDUCTION, AND PACKAGING EFFICIENCIES. WHILE THERE ARE MANY PACKAGING OPTIONS TO MEET VARIOUS PACKAGING DEMANDS, FLEXIBLE PACKAGING OFFERS CONSIDERABLE SUSTAINABLE ADVANTAGES, WITH FEWER TRADE-OFFS. THE FOLLOWING PAGES PROVIDE COMPARATIVE EXAMPLES OF THE MANY POSITIVE ASPECTS OF USING FLEXIBLE PACKAGING.
Parcel Mailer Packaging

Two forms of express postal mailers are commonly used: 100% recycled paperboard with 35% post-consumer recycled material; and HDPE flexible pouches.

- Recycled paperboard mailers produce 7.5 times more landfill waste by weight per 100 g of product than HDPE flexible pouch mailers (taking into consideration a 12% recovery rate of paperboard).
- The flexible pouch mailer uses 1/8 the amount of packaging per 100 g of product vs. the paperboard mailer.
- Use of the recycled paperboard mailer increases shipping weight by 0.19 lbs, resulting in increased mailing costs of $3.38 for FedEx Standard Overnight® vs. using an HDPE flexible pouch mailer.

<table>
<thead>
<tr>
<th>Package Format</th>
<th>Product Weight</th>
<th>Weight of Packaging</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Recycled Paperboard Mailer</td>
<td>13.28 ounces (376 g)</td>
<td>96.38 g</td>
<td>4:1</td>
<td>25.63 g</td>
</tr>
<tr>
<td>HDPE Flexible Pouch Mailer</td>
<td>13.28 ounces (376 g)</td>
<td>11.33 g</td>
<td>33:1</td>
<td>3.01 g</td>
</tr>
</tbody>
</table>

FedEx® mailing assumptions: 1.0 lb product without packaging mailer (mailer weight added for cost estimate), residential address ship from ZIP code 21202 (Baltimore) to 60602 (Chicago), declared value $10.00, FedEx Pak package type, FedEx.com rate finder 9-10-07.
FedEx and FedEx Standard Overnight are registered trademarks of FedEx Corporation.
Product weight assumption: 100 sheets of 24 lb 8.5” x 11” copy paper
Landfill waste data source: The ULS Report, February 2007
Flexible “Brick Pack” Packaging

Coffee has traditionally been packaged in metal cans. Technology advances have created rigid plastic containers, and now new flexible structures such as the brick pack.

- Flexible brick packs contain 88% less packaging by weight when compared to metal cans.¹
- Brick pack flexible packaging for coffee reduces weight of waste to landfill by 72% vs. metal cans (taking recycling rates of cans into account).²
- The energy savings equivalent of changing all steel can coffee packaging to flexible brick packs is more than 17,200,000 gallons of gasoline per year.
- Flexible brick packs use 20% less space in shipping than cans³.

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</tr>
</thead>
<tbody>
<tr>
<td>Metal Can With Plastic Lid</td>
<td>11.5 ounces (326 g)</td>
<td>96.38 g</td>
<td>3:1</td>
<td>29.56 g</td>
</tr>
<tr>
<td>Plastic Container &amp; Lid</td>
<td>11.5 ounces (326 g)</td>
<td>59.53 g</td>
<td>5:1</td>
<td>18.26 g</td>
</tr>
<tr>
<td>Flexible “Brick Pack”</td>
<td>11.5 ounces (326 g)</td>
<td>11.33 g</td>
<td>29:1</td>
<td>3.47 g</td>
</tr>
</tbody>
</table>

¹Calculations compare 422.38 g total weight metal can with plastic lid (326 g of contents) versus 337.33 g total weight “brick pack” (326 g of contents)
²The ULS Report, February 2007, “Coffee Conundrum” Case Study
Flexible Pouch Packaging

Package designers have recently introduced stand-up flexible pouch packaging to drive consumer interest and incremental sales over the traditional bag-in-a-box design.

- Bag-in-a-box packaging produces 2.4 times more landfill discards per 1000 lbs of raisins than stand-up flexible pouches.
- Stand-up flexible pouches use 37% of the packaging by weight compared to bag-in-a-box packaging.
- Compared to bag-in-a-box, stand-up flexible pouches have the potential to significantly reduce waste and unsellables that are caused by in-transit and handling damage.

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</tr>
</thead>
<tbody>
<tr>
<td>Round Paperboard Canister with Plastic Lid</td>
<td>24 ounces (680 g)</td>
<td>39.69 g</td>
<td>17:1</td>
<td>5.83 g</td>
</tr>
<tr>
<td>Folding Carton with Inner Poly Bag</td>
<td>12 ounces (340 g)</td>
<td>22.68 g</td>
<td>15:1</td>
<td>6.67 g</td>
</tr>
<tr>
<td>Stand-up Flexible Pouch</td>
<td>24 ounces (680 g)</td>
<td>11.34 g</td>
<td>60:1</td>
<td>1.66 g</td>
</tr>
</tbody>
</table>

Flexible Beverage Pouch Advantages

Beverages have typically been packaged in aluminum cans, glass, or plastic bottles. Stand-up flexible pouches are making large inroads in packaged juices and fruit drinks.

- Per 100 g of product, stand-up flexible pouches present 96.7% less packaging weight than glass bottles, 70.8% less packaging weight than PET containers, and 40.4% less packaging weight than aluminum cans.

- Per 100 g of product, use of glass bottle packaging results in 25 times more landfill material by weight than stand-up flexible pouches.

- Stand-up flexible pouches significantly reduce greenhouse gases released and petroleum consumed during the transport of unfilled packaging from package converter to filling operation.

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</thead>
<tbody>
<tr>
<td>Glass Bottle &amp; Metal Cap</td>
<td>8 ounces (236 g)</td>
<td>198.4 g</td>
<td>1:1</td>
<td>83.9 g</td>
</tr>
<tr>
<td>Plastic PET Bottle &amp; Cap</td>
<td>8 ounces (236 g)</td>
<td>22.7 g</td>
<td>10:1</td>
<td>9.6 g</td>
</tr>
<tr>
<td>Aluminum Can</td>
<td>8 ounces (236 g)</td>
<td>11.3 g</td>
<td>21:1</td>
<td>4.7 g</td>
</tr>
<tr>
<td>Stand-up Flexible Pouch</td>
<td>6.75 ounces (199 g)</td>
<td>5.7 g</td>
<td>35:1</td>
<td>2.8 g</td>
</tr>
</tbody>
</table>

*Product assumed to be water
Landfill avoidance data source: The ULS Report, February 2007
#10 Flexible Pouch Vs. #10 Metal Can

Flexible pouch packaging is an alternative to metal cans, glass containers, and plastic tubs for a wide range of food service applications. Its value in commercial food service is demonstrated here:

- The flexible pouch is less than 1/10 the packaging weight compared to the metal can.
- Each case of #10 flexible pouches with finished product utilizes 30% less volume than a case of #10 cans.
- Flexible pouches eliminate the sharp edges, broken glass, and metal filings that are possible with other packaging systems.
- Flexible packaging materials have high BTU fuel content, making the material an efficient fuel source for waste-to-energy facilities (where available).
- Flexible pouches offer benefits such as reheating in the pouch, dispensing fitments, and visibility of the product.
- Coextruded flexible packaging materials provide product storage stability and quality preservation for perishable products.

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</tr>
</thead>
<tbody>
<tr>
<td>#10 Metal Can</td>
<td>108 ounces (3,064 g)</td>
<td>312.4 g</td>
<td>10:1</td>
<td>10.2 g</td>
</tr>
<tr>
<td>#10 Flexible Pouch</td>
<td>108 ounces (3,064 g)</td>
<td>28.4 g</td>
<td>108:1</td>
<td>0.9 g</td>
</tr>
</tbody>
</table>

Source: Sealed Air Corporation, www.sealedair.com
Comparison of Multi-Unit Container Systems

Flexible collation shrink wrap packaging is one of the fastest-growing trends in packaging. Beyond its value as “see-through” packaging, collation wrap can reduce product shift in transit, decreasing breakage and/or product waste. Its other waste reduction properties include:

- Compared to paperboard folding containers (such as in this study), flexible shrink provides an 81% reduction in packaging weight.
- Shrink wrap packaging (in this comparison) offers 6 times more product-to-package ratio.

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</tr>
</thead>
<tbody>
<tr>
<td>Paperboard</td>
<td>120 ounces (3,402 g)</td>
<td>994 g</td>
<td>3:1</td>
<td>29.2 g</td>
</tr>
<tr>
<td>Shrink Wrap</td>
<td>120 ounces (3,402 g)</td>
<td>189 g</td>
<td>18:1</td>
<td>5.6 g</td>
</tr>
</tbody>
</table>

Source: The Dow Chemical Company, internal calculations based on data derived per Environmental Defense (www.papercalculator.org); Boustead Model V5; The ULS Report, February 2007; and a raw material cradle-to-gate, plus recycle system boundary.
Comparison of Flexible Pouch Vs. Rigid Dome Container

Ready-to-eat rotisserie chickens have traditionally been packaged in rigid dome containers. Innovative technology now allows a flexible package to perform in a deli hot case for freshly prepared foods while reducing environmental impacts.

- 88% less fossil fuel is used, and 85% less CO₂ emissions are generated during the manufacturing of flexible pouches.¹
- The fossil fuel equivalent of changing a year’s worth of rigid dome rotisserie chicken packaging to flexible pouches would save enough gas to drive around the world 1,475 times.²
- Flexible pouches use 91% less space by case in shipping. More than 12 truckloads of rigid containers are needed to ship the same amount of Hot N Handy® pouches contained in one 53’ long truckload.³
- Flexible pouch packaging offers a 2/3 reduction of solid waste by weight introduced in landfills versus rigid dome packages.¹
- Coextruded flexible packaging offers value-added features such as a built-in handle, a resealable zipper, and being microwavable and hot case ready.
- Brand owners gain custom printing capabilities for branding and merchandising on all sides of the pouch.

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</tr>
</thead>
<tbody>
<tr>
<td>Rigid Dome Container (Tray + Lid)</td>
<td>40 ounces (1,134 g)</td>
<td>64 g</td>
<td>18:1</td>
<td>5.6 g</td>
</tr>
<tr>
<td>Hot N Handy® Flexible Pouch</td>
<td>40 ounces (1,134 g)</td>
<td>15 g</td>
<td>76:1</td>
<td>1.3 g</td>
</tr>
</tbody>
</table>

Source: Robbie Manufacturing, Inc.,
Product weight assumption: Average weight of cooked whole rotisserie chicken
¹Data based on 2007 Life Cycle Analysis testing by Robbie Manufacturing, Inc., conducted using SimaPro 7.1 LCA Software
³Based on industry average packaging/shipping dimensions of rigid packaged rotisserie chicken
Less Waste in the First Place®

EXCEPTIONAL PACKAGING SOLUTIONS USING LESS PACKAGING MATERIALS. FLEXIBLE PACKAGING IS AN EXCELLENT SUSTAINABLE CHOICE THAT OFFERS DISTINCTIVE VALUE THROUGHOUT ITS LIFE CYCLE FOR EVERYONE WHO USES IT.

WITH FLEXIBLE PACKAGING, CONVERTERS, MANUFACTURERS, PACKAGERS, AND LOGISTICS PERSONNEL GAIN COST-EFFECTIVE, EFFICIENT PRODUCTION AND HANDLING. RETAILERS BENEFIT FROM TIGHTER, EYE-CATCHING SHELVES AND PRODUCTS WITH LONGER SHELF LIFE. CONSUMERS ENJOY SAFETY AND CONVENIENCE FEATURES, AND WE ALL REAP THE ENVIRONMENTAL REWARDS OF LESS ENERGY AND RAW MATERIAL CONSUMPTION AND LESS VOLUME IN THE LANDFILLS, BECAUSE FLEXIBLE PACKAGING CREATES LESS WASTE IN THE FIRST PLACE.®