Avoiding the Biodegradation Minefield

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Who is BioLogiQ?

- Idaho Falls based company, founded in 2011.
- Established to create a useful plastic from the excess starch produced during potato processing.

- Our goal is to provide plant-based biopolymers that enable material & energy reductions, recyclability, and/or biodegradability, helping to build a world free of pollution caused by plastics.
- Our pre-compounded base resin is known as NuPlastiQ® BioPolymer.

What is NuPlastiQ?

- **NuPlastiQ** is made from plant-based carbohydrates, along with small amounts of naturally sourced glycerin.
- **NuPlastiQ** contains 100% USDA Certified Biobased Content.
- Passed ASTM D6400 testing for industrial composting and ASTM D6691 for marine biodegradation. TUV has also certified **NuPlastiQ** to be compostable and marine biodegradable.

What is NuPlastiQ?

- **NuPlastiQ** biodegrades too fast for most commercial uses.
- Therefore, we normally blend **NuPlastiQ** with other traditional plastic or bioplastic resins via a proprietary process (Eco-Alloy^{sm} Reactive Extrusion). The result is a new family of **BioBlend**® Resins with enhanced functional and environmental performance.
- Typical legacy compounding partners include polyolefins - LLDPE, HDPE, PP, PS and HIPS.
- We have also successfully created compounds by blending **NuPlastiQ** with bioplastic resins such as PLA, PHA and PBAT.

What is Biodegradation?

- Biodegradation occurs when materials are broken down into simpler materials by bacteria, fungi, or other biological means. Composting requires biodegradation in order for organic matter to decompose and be turned into fertilizer and soil conditioners.

Disintegration and fragmentation are forms of degradation. But they are not biodegradation!

1. In most cases, degradation means that the structural integrity of a product is compromised (often due to chemical or mechanical actions).

2. It is possible for a product to degrade or fragment without actually biodegrading, potentially increasing plastics in the environment.

3. Fragmentation can sometimes help increase the rate of biodegradation, but simple degradation does not guarantee that a product will biodegrade.

Disintegration and fragmentation are forms of degradation. But they are not biodegradation!

4. If leaked out of a closed loop system, the most desirable result for plastic products is that they biodegrade.

5. Biodegradation of a plastic is confirmed through testing by measuring the actual amount of carbon elements that are converted into carbon dioxide and methane gases during the test period.

Marine Biodegradation Standard: ASTM-D6691

- ASTM-D6691 tests for the amount of degradation that occurs in a marine environment.
- This is not a pass/fail test. The reports indicate what percentage biodegraded over the tested time period.

Marine Biodegradation Standard: ASTM-D7081

- ASTM-D7081 is a **pass-fail marine biodegradability test** that imposes amount and time limits on:

  1) the biodegradation in a marine environment according to ASTM-D6691 (30% in 180 days), and

  2) biodegradation in industrial compost conditions according to ASTM-D5338 (90% in 180 days).

Note that this standard has lapsed and is not active. Currently, there is no widely accepted standard for marine biodegradability certification.

Biodegradation is a process, not an end result.

- Thus, **making promotional claims specifically related to biodegradability is not generally recommended**. (For reference, it is illegal in the state of California to make claims related specifically to biodegradability.)

- The best way to make claims is to have a specific package tested and/or certified for compostability or marine biodegradability. This can take 18-24 months, given the series of tests and approvals that must occur.

Biodegradation is not a panacea!

- Partially biodegraded materials are still pollutants.
- The results of biodegradation are water vapor and greenhouse gases such as carbon dioxide, methane, and ammonia.

Biodegradation is the last line of defense

- It will always be preferable to reduce, reuse, and recycle packaging than to have it biodegrade.

- The real value of biodegradation is a safeguard against environmental impact, should packaging “leak out” of a closed loop system.

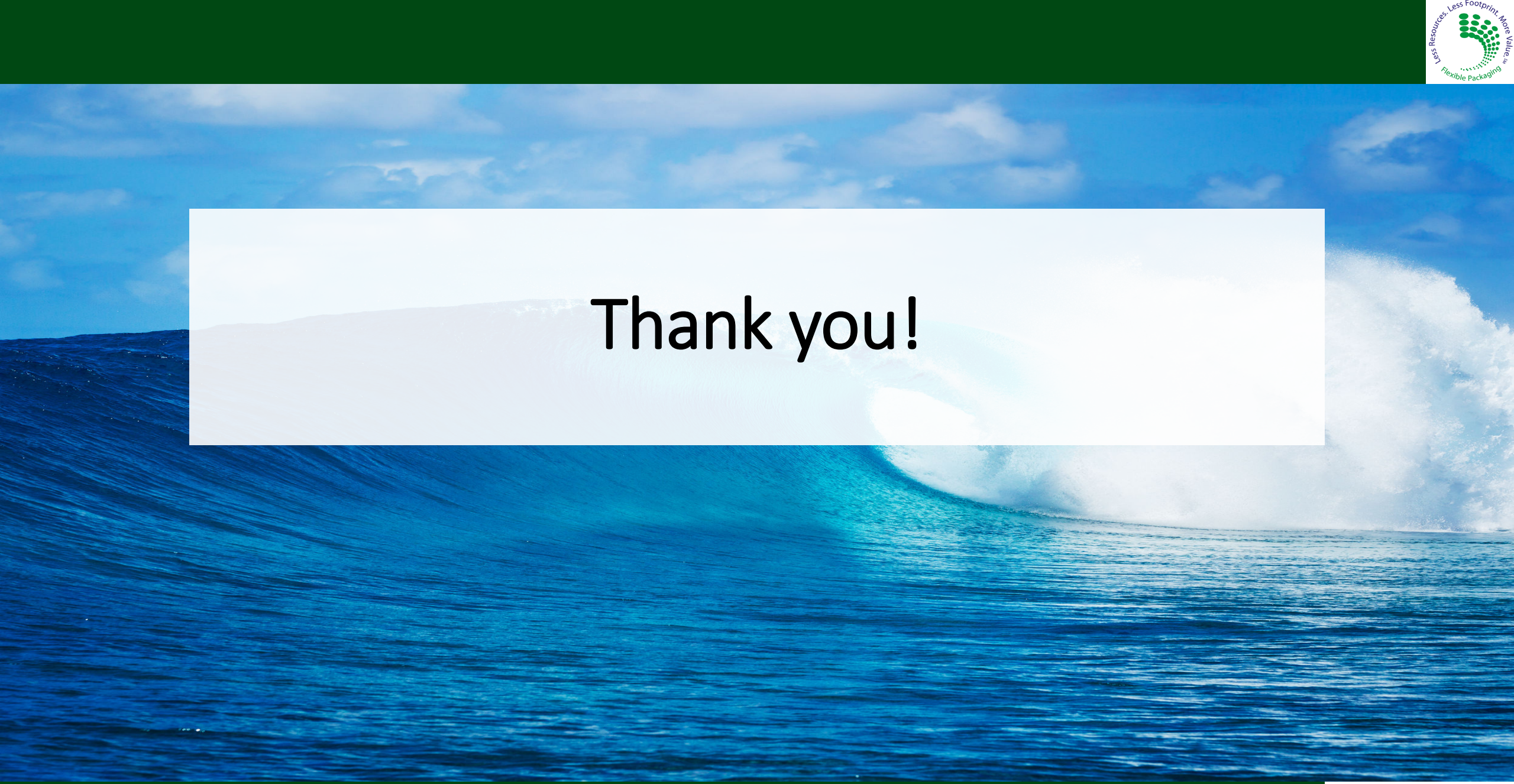
Education is Critical

- Consumers must be educated to ensure that they don't simply toss compostable or marine biodegradable packaging into the environment because they believe it will simply "go away".

Standards May Not Reflect the State of the Art

- Biodegradation standards are based on legacy products such as PLA, and require disintegration/fragmentation.

- There are new products coming on line, including **NuPlastiQ**, that will require new or revised certification standards.


Thank you!