Glass Beneficiation – Where We Are and How We Got Here

Charlie Forbes, Chief, Recycling, Compliance, and Planning
Solid Waste Management Program

June 14, 2017
Outline

• Quick Review of Timeline – *think Geological Time, not next week*
• Quick Review of Potential Uses – *not your father’s sand and gravel*
• Some Details That Engineers Will Need To See (and Believe)
• The Fairfax Approach
• Quick Review of Supporting Financial Analyses*
• Introducing Lil’ Green and Big Blue (*these are stage names*)
• Initial Challenges
• Next Steps
• Ideas? Questions? Comments?

* - Financial Analysis performed by a chemist
Timeline

• The Turn of the Century – post-consume glass markets begin to focus on glass from bottle-bill states
• 2010-ish – DMV post-consumer glass market in the doldrums
• 2014 – SWMP begins to research options for glass
• 2015 – NERC Glass Recycling Forum
• 2016 – Develop product use and general business case, purchase small machine to test/demo concept – Lil’ Green
• 2017 – Install commercial-grade capacity – Big Blue
Quick Review of Potential Uses For Crushed Glass

• **Filtration:**
  Choker Grit, Pipe Bedding, Backfill, Drainage Aggregate, Septic Fields, Underdrains, French Drains, Golf Course Green Drainage

• **Aggregate:**
  Backfill/Clean Fill, Embankments, Clean Fill Sand, Hydroponics, Landfill Cover, Oil Spill Cleanup, Road Sand, Solar Heat Storage, Termite Barrier, Utility Bedding and Backfill, Weighted Bags

• **Glassphalt - Paving Application:**
  Aggregate Base Course, Asphalt Base Course-Glassphalt, Asphalt Surface Course-Glassphalt, Parking Lots and Driveways

• **Exotic Stuff – Aesthetics, Manufacturing Feedstock**
For Most Public Works Applications:

- Material specifications (“Off road” applications *may* be able to side-step these)

- Crushed glass permitted by VDOT as a substitute for aggregate in most cases. See S200.04, which presents general substitution language, replacing minus-3/8 aggregate

- Example project: Mosaic at Merrifield Shops, award-winning glassphalt project by Virginia Paving Co. and recognized by VDOT as its “Non-VDOT Green Project of the Year” in 2012

Permissible applications of particular interest include:

- Foundation/underlay for pipes, replacing Crusher Run Nos. 25 and 26
- Embankment fill (S3030B-0702)
- Draining embankment and backfill (but not for undercutting or foundation support, some other restrictions)

See VDOT construction specs S303B and S303F0B, and also Section 401.03, which describes the use of CG as porous backfill

- Typical QC and testing requirements, and no more than 5% non-glass.
The Fairfax Approach

- Research available technologies, and product types and needs
- Implement a pilot-scale project to establish proof of concept
- Assuming good pilot results, implement a larger-scale project

Projects are not intended to serve County-wide needs, but to demonstrate a feasible new approach and “prime the pump” for private-sector investment.
Summary of Supporting Financial Analyses

• Useful/defensible data on earth products consumption was difficult to get

• Focused on internal demands for initial demonstration
  – Maintenance of I-66 tipping floor uses approx. 700 tons of gravel per cycle
  – Maintenance of I-95 driveway consumes approx. 9,000 tons of mat’l per cycle.
  – I-95 facility internal asphalt roadway.

• The above projects could save >$50K by using crushed glass. Also avoids the glass disposal cost (approx. $30/ton). Driveway project had projected value of >$300K

• DPWES-SWMP collects approx. 1,200 tons of glass per week. Market trends suggest that combined revenue and savings could cover initial cost within 3-5 years

• With aggressive outreach/education, and an expanded level of participation, the projects have the potential to generate up to $3M of revenue/savings per year
Lil’ Green
Lil’ Green (continued)

- Grinds glass into two usable sizes (- 1/8” and – 3/8”)
- Automatically separates labels and trash from ground glass
- Rated capacity of up to 1000 lbs. per hour
- Proprietary crusher system (“friendly glass”, Compactors, Inc.)
Big Blue
Big Blue (continued)

- Grinds glass into two usable sizes (- 1/8” and – 3/8”)
- Automatically separates labels and trash from ground glass
- Rated capacity 20 tons per hour
- Proprietary crusher system (“friendly glass”, Andela System, Inc.)
Initial Challenges

• Original Concept for Lil’ Green was direct public access – Safety and Risk Management folks had concerns - additional modifications needed to allow for easier product handling and to address safety concerns

• Operations staff and public participation – outreach/education

• There are always more good ideas than the capacity to execute

• Lots of interest but still ISO active/engaged partners to deliver volume – examining regulatory and contracting options
Next Steps

• Increase the volume of incoming material – “If you make a pile, construction engineers will come…”

• Explore various operating configurations/conditions to optimize efficiency and yield, and to maximize product quality

• Identify and secure higher/better applications to close the loop.
  – Construction material demands are sufficient but...
  – Aesthetic applications
  – Tie-in at the retail level (close the loop)
  – Manufacturing feedstock for more exotic applications
  – Other?
The search for ideas and opportunities continues, but some ideas are better than others...

_BagOGlassV2.mp4_
Fin

• Ideas?
• Questions?
• Comments?
Additional Information

For additional information, please contact

Charlie Forbes
Department of Public Works and Environmental Services
Solid Waste Management Program
703.324.5230
Charlie.Forbes@fairfaxcounty.gov
www.fairfaxcounty.gov/dpwes