

# Circular Economy for building materials

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USG Corporation is an industry-leading manufacturer of **building products** and **innovative solutions**

For more than 115 years, we have expanded the boundaries of building science with products and systems that are safer, lighter, stronger and more sustainable.

Our products have been used to build some of the world's most iconic structures, such as the Freedom Tower in New York, Burj Khalifa in Dubai, and Lotte Tower in Seoul.



FOUNDED  
IN 1902



HEADQUARTERED  
IN CHICAGO



7,100  
EMPLOYEES



49 MANUFACTURING  
LOCATIONS



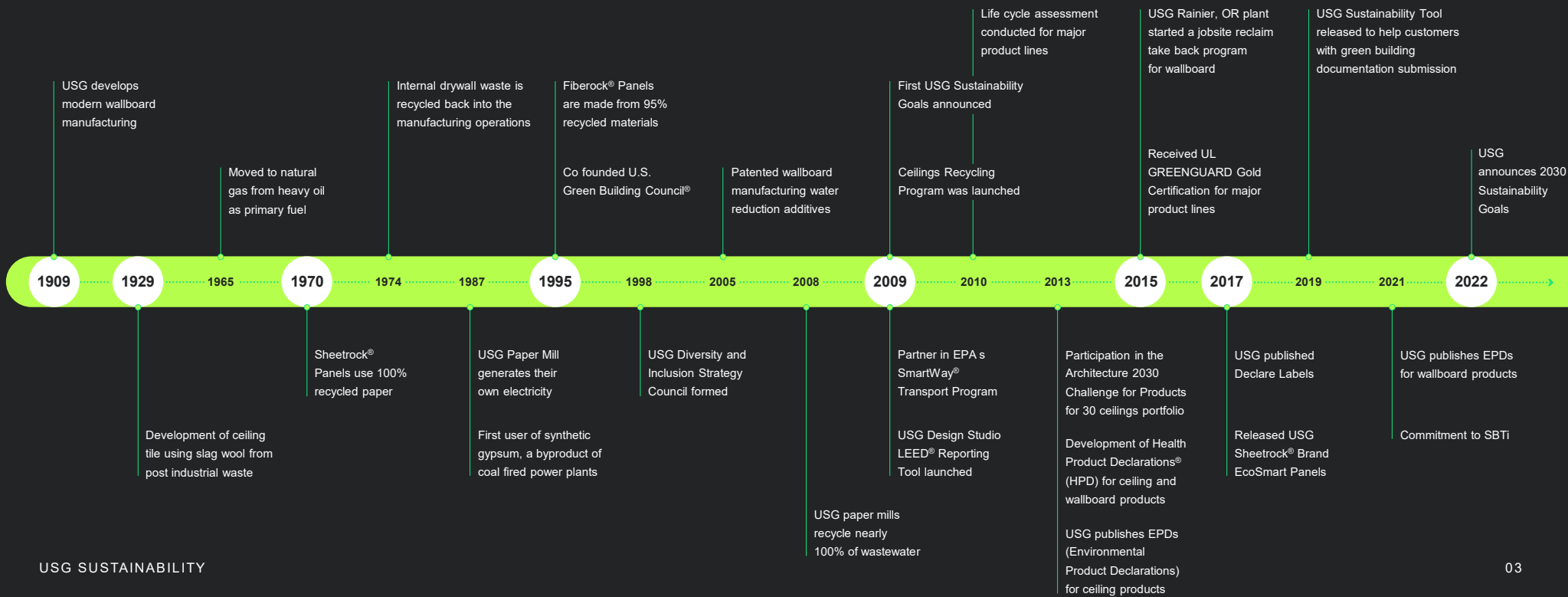
3,345 ACTIVE  
PATENTS

## SUSTAINABILITY

Sustainable practices have been core to USG's business and choices for more than 100 years. It's how we build a better world for our customers, employees and communities while caring for our business and the world around us.

USG is the only wallboard manufacturer to join in the **Architecture 2030 Challenge for Products**, where we voluntarily work to lower our carbon footprint in sourcing, manufacturing and transportation by 2030. This is part of a larger effort to design, build and operate carbon-neutral buildings by 2050.

# Our Second Century In Sustainability



# Delivering A Circular Economy

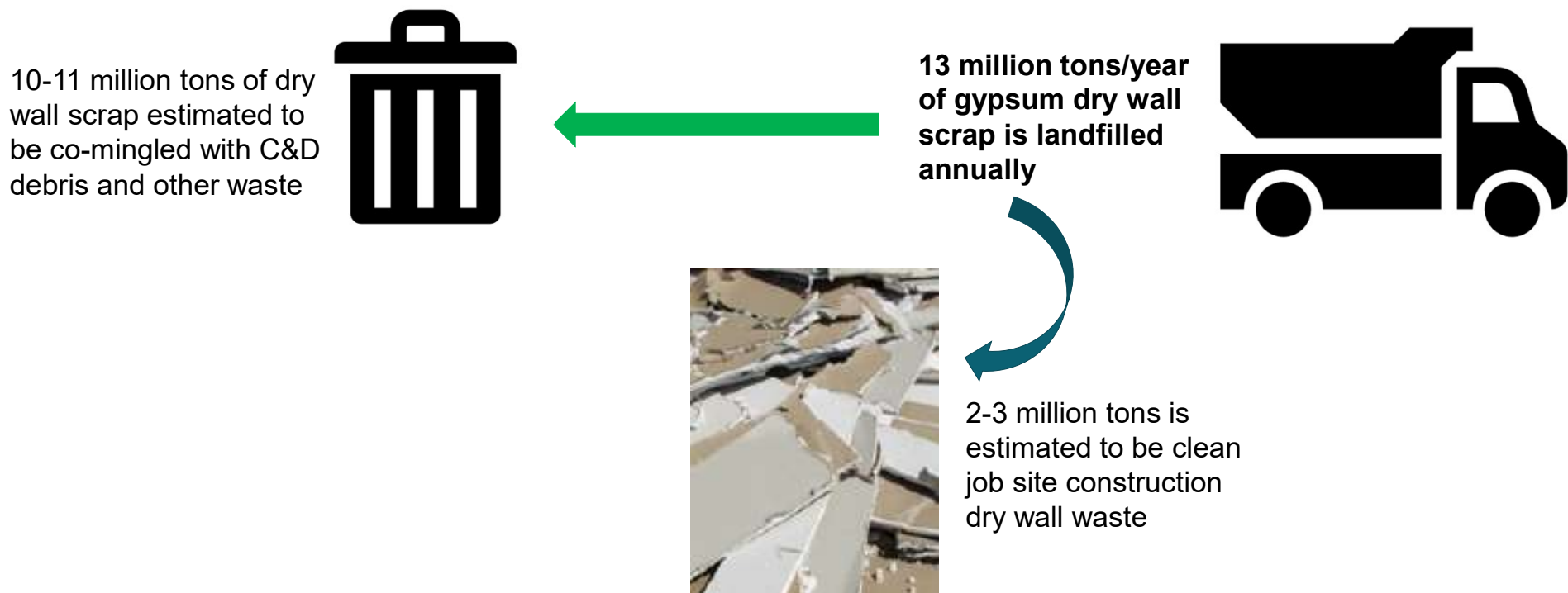


Along with climate change, waste generation is one of the most challenging problems that humanity faces today and in the future. USG is improving our recycling practices in the communities where we operate. We'll continue to invest in partnerships with companies that will help us reach our targets.

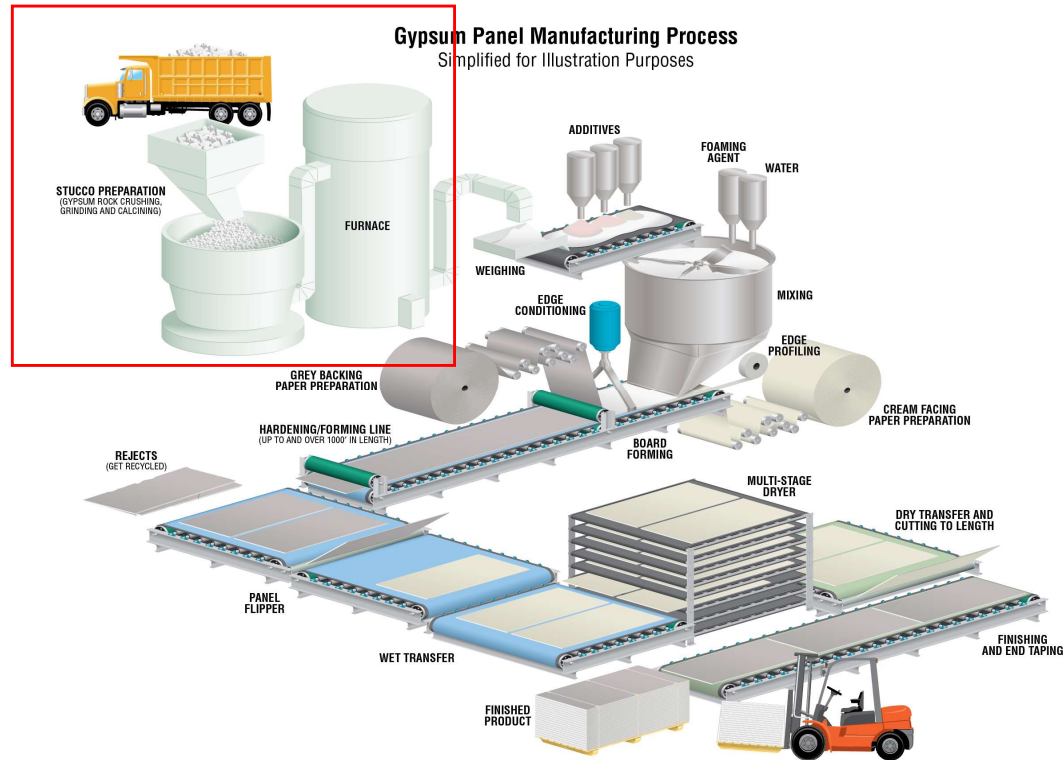
- Become the recognized leader in construction job site reclaim for gypsum board and ceiling tile recycling
- Achieve zero manufacturing waste to landfill



# Urban recycling to build a circular economy in USA



# How is dry wall made?

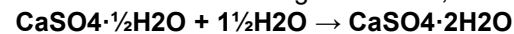


The dehydration of natural gypsum or synthetic gypsum (specifically known as calcination) is between 120 to 150° C (250 to 300° F) and the heat energy delivered to the gypsum (the heat of hydration) goes into driving off water and not into increasing the temperature of the mineral as shown below:



The partially dehydrated mineral is called calcium sulfate hemihydrate or calcined gypsum (though more commonly known as plaster of Paris) and has the chemical formula  $\text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$ . (Exterior plaster or Stucco).

Calcined gypsum has an unusual property: when mixed with water at normal (ambient) temperatures, it recombines with the water that was driven off during calcination, and sets to form a strong gypsum crystal lattice: (e.g. at mixer followed by kiln)



# Extract gypsum from clean construction dry wall scrap



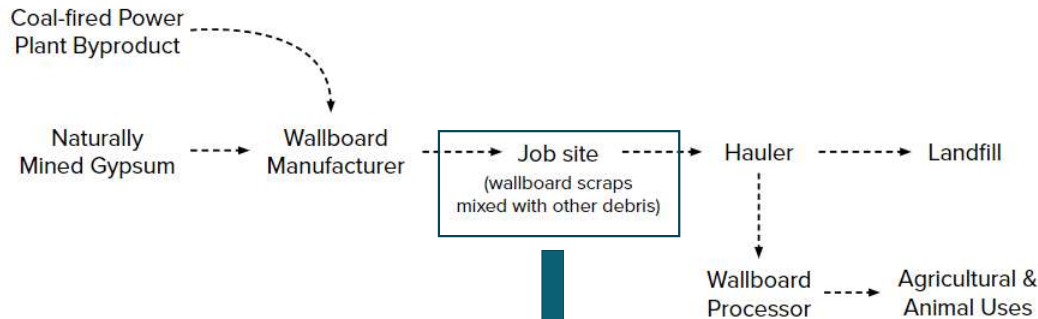
Clean job site construction dry wall gypsum waste



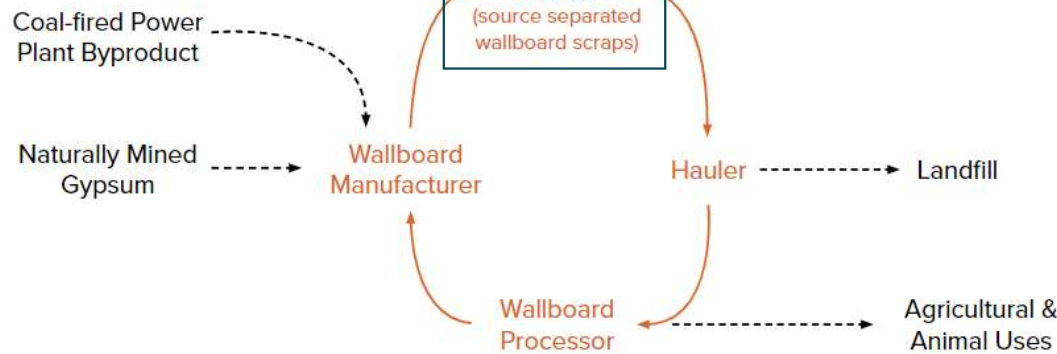
Ground gypsum from clean job site construction dry wall gypsum waste

# Building a circular economy for gypsum contractor waste

## CURRENT STANDARD PRACTICE



## A CLOSED LOOP ALTERNATIVE



## Challenges:

Ability to implement construction job site separation of dry wall scrap from other construction debris.

(<https://vimeo.com/135889925/cbb111116b>)

## Requirements of construction job site haulers:

- Dry wall that has NOT been previously installed (i.e., no demolition scraps)
- Scraps have no paint on them
- Scraps have no nails or screws
- No metal trims
- No garbage



## Additional challenges to building a circular economy

Litigation risk from potential contamination.

Material product safety concerns:

- Exposure during service life (e.g. lead paint.)
- Unknown source (e.g. “Chinese drywall.”)
- Asbestos contamination.
- Additives that are carried over into post-consumer recycled (PCR) dry wall waste

Consistent supply:

- PCR dry wall waste collection and processing continues to be erratic and varies according to job site

Separation of paper from gypsum

- Even with paper “removed” a significant amount% of paper is carried with the gypsum, which is mechanically and chemically bonded to gypsum slurry during manufacturing.

## Summary to building a circular economy

Can these obstacles be overcome?

Yes, but not easily or quickly.

What will it take?

Significant investment in R&D, potential process adjustments, material handling and feeding adjustments, etc.