



# Why Less Is More When It Comes to ULT Freezers

The greater value of saving energy and space at the same time

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*At Stirling Ultracold, we not only provide ultra-low temperature solutions that reduce lab energy consumption, environmental impacts and costs, but also optimize floor space utilization. This article will explore the combined energy, space and overall cost savings that can result from replacing older ULT freezers with more energy- and space-efficient ULT freezer units.*

## Use Less Energy, Save More Money

Legacy, compressor-based ULT freezers demand large amounts of power to operate in the lab, consuming as much electricity as the average U.S. household. Stirling Ultracold ULT freezers use up to 75% less energy to operate than standard compressor-based systems and sacrifice neither performance nor reliability. This is due to the inherent efficiency of their innovative free-piston Stirling Ultracold engine technology, which is at the heart of our ULT freezers.



## Standard ULT Energy Consumption



By replacing legacy ULT freezers with ENERGY STAR®-certified units, such as the Stirling Ultracold upright SU780XLE model, a user can greatly reduce both energy use and carbon footprint. Our ULT freezers also give off much less heat than traditional compressor-based ULT freezers. This reduced heat demands less from running air conditioners to maintain comfortable interior temperatures, thereby reducing HVAC operating costs and designed-in facility capital cost. Many labs may still be overlooking these significant energy-related cost savings.

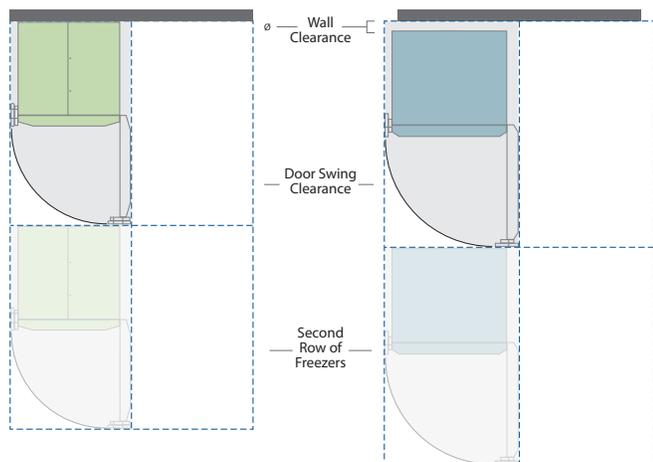
## The Hidden Costs of Unrealized Space

Many of today's biorepositories and labs face space limitations for storing their valuable biological samples. These organizations may be contemplating costly new facility construction or renovations to accommodate their growing sample inventories. This may not be necessary when considering the space-saving opportunities afforded by a small-footprint ULT freezer design. When it comes to comparing interior storage volume relative to exterior size specifications, not all freezers are created equal. Stirling Ultracold's upright ULT model offers abundant storage volume in the cabinet — yet has the smallest exterior footprint dimensions of comparable models.

When considering the best method of placing multiple ULT freezers in a room — including minimum clearance requirements between freezers, against walls and door swings — more Stirling Ultracold SU780XLE ULT units can be positioned in a given floor space than similarly sized models. With its much narrower door, you won't need as much door swing clearance. And with its unique upper-side air venting design, the Stirling Ultracold ULT model can also be placed directly against walls, unlike comparable models. By combining these footprint and clearance advantages, you can arrange more freezers in limited spaces and potentially avoid costly lab renovations. When you consider lab floor space cost per square foot/meter relative to freezer storage capacity, this advantage creates valuable floor space savings per year.

### Stirling Ultracold ULT 4 ULT Freezers

### Compressor-based ULT 4 ULT Freezers



### Maximizing Storage Density

ULT storage density is measured by the number of samples that can be stored in a freezer's footprint and overall floor space. When looking to replace older ULT freezers or upgrading facilities to accommodate increased storage needs, fewer freezers will be needed to replace your required storage capacity if high-density storage is applied in a high-capacity freezer design. If you use a concentrated rack system like Stirling Ultracold's new 700-box storage solution, along with 100 cell dividers,

you can not only achieve needed storage capacity by purchasing fewer freezers, but also save additional space and energy by operating fewer units overall.

### Bringing It All Together

If you combine the benefits from energy savings, floor space savings and storage density, you can think differently about replacement and expansion of ULT storage. If your lab takes full advantage of this combination by thinking in terms of replacing/expanding sample storage capacity rather than freezer units, substantial capital and lifetime operating cost savings can be achieved. ULT freezers that combine energy efficiency, space savings and high-density storage can reduce energy use and lower infrastructure and floor space costs per sample stored, while significantly shrinking the operating carbon footprint of the lab/biorepository. New construction or expansion of current facilities may not even be necessary in some cases. These factors have a synergistic relationship, giving you a better return on your ULT storage investment in fewer years.

As labs and research facilities become increasingly conscious of their environmental footprints, energy usage and overall operating costs, they must consider the lifetime impact of the ULT freezers that are being used to continuously store and keep their valuable samples safe. We have developed several beneficial tools to help determine your energy, space and operating cost savings by replacing older, traditional ULT freezers.

### Savings From 1:1 ULT Unit Replacement

#### Total Energy Cost Savings/Year

Unit Energy Cost Savings/Year × Units Replaced

#### Total Floor Space Savings†

(Legacy Unit Footprint† Area – New Unit Footprint† Area) × Units Replaced

#### Floor Space Cost Savings/Year

Total Floor Space Savings × Yearly Facility Cost per sq. ft/m

$$\frac{\text{Total New Freezer Investment}}{\text{Energy Cost Savings/Year} + \text{Floor Space Cost Savings/Year}} = \# \text{ Years ROI}$$

### Savings From 1:1 Sample Capacity Replacement

#### Number of Replacement Units Needed

$$\frac{\text{Legacy Freezer Sample Capacity}}{\text{High-Density Freezer Sample Capacity}} \times \text{Units to Replace}$$

#### Additional Energy Cost Savings

from Operating Fewer Freezers

#### Additional Floor Space Savings

from Fewer Freezers on the Floor

#### Additional Floor Space Cost Savings

from Fewer Freezers on the Floor

#### Capital Purchase Cost Savings

from Buying Fewer Freezer Units

#### Faster ROI

from Buying, Operating and Placing Fewer Freezers

† Floor space savings will vary depending on room dimensions and arrangement of freezers in rows.  
‡ Include clearances in footprint area

Learn more about optimizing your next ultra-low storage investment and contact a Stirling Ultracold representative at [stirlingultracold.com/solutions/financial-savings](http://stirlingultracold.com/solutions/financial-savings).

