

## Appliances

The Appliances competition within the Decathlon judges the effectiveness of various appliances within the home. The fridge and freezer must be kept within a specific temperature range for the duration of the competition. The washer must successfully wash eight loads of towels, while the dryer must return the towels to their pre-washed weight within a specified time interval. The dishwasher must reach 120°F during a normal cycle. The Appliances contest does not award points for energy efficiency; however, teams must seek to minimize the energy use from these appliances in order to earn top marks in the Energy Balance competition.

The Radiant House features many innovative appliances with sustainable benefits. The refrigerator/freezer is produced by SunFrost and retails for \$2849. SunFrost appliances are designed to run in low-energy conditions, especially solar powered homes. They typically consume less than twenty percent of the energy required to run a traditional refrigerator by using a top-mounted cooling system and passive cooling methods. They are designed to last more than twenty years, fitting the needs of the retired couple the house is intended for. Although the up-front cost is significantly more expensive than a traditional refrigerator, the costs are somewhat offset by the energy savings provided by the technology. The refrigerator unit serves as an example of the team's decision to choose energy efficiency over cost.

However, cost still played an important factor in the team's choice of appliances. All the other major appliances, including the washer, dryer, dishwasher, induction cooktop, and oven, were donated by Bosch at no charge to the team. The team must still account for these costs in the Affordability section as part of the value of the home, but the team will not have to raise the funds to purchase those appliances. As the team struggles to raise over one million dollars to

cover their costs, it is a relief to not have to worry about the \$7290 in Bosch appliances that will be used in the house.

Interestingly enough, the competition does not award a score for minimizing environmental impact. There is little incentive for the team to rack up extra costs or sacrifice points in other contests to be as sustainable as possible. The most sustainable choice might not be the most practical, or even the most ethical. For example, if the house was marketed to a lower-income demographic, it would not make sense to have a \$2900 refrigerator because the up-front cost would be prohibitive. Because the home is intended for wealthier residents, the team has greater liberty in selecting “luxury” sustainable appliances; however, they must also balance concerns related to their Affordability score.

Ideally, the team would select appliances with the least environmental impact. While most of these appliances are indeed energy efficient, that efficiency gives the team the tangible benefit in the Energy Balance competition. The outcome is positive for the environment even though that was not necessarily the primary objective. It is helpful that the Solar Decathlon encourages sustainability through its emphasis on energy conservation, but it also gives teams a reason to neglect ethical concerns in the interest of pursuing the highest score.

However, the design of the dryer does show a particular attention to sustainability. A Santa Clara graduate student has been working to modify the dryer to make it 10-20% more efficient. The design intakes preheated air from above the photovoltaic panels and passes it through a heat exchanger to warm cool air coming in from the house. It also recycles its own exhaust for heating purposes as well. The design takes advantage of waste heat and the power of the sun to save energy. The extra emphasis on this project, with additional time, labor, and cost

investment, shows the team is still committed to innovating for reduced environmental impact, even when there are perhaps easier options available.

The remaining appliances are still unique in the ways they minimize energy use. The induction stove uses a magnetic field, rather than gas or electric power, to safely heat ferromagnetic cookware. Bosch dishwashers are the most efficient of their kind, allowing two gallons of water to replicate the washing power of 1300 gallons of water. The oven has the shortest self-cleaning time of any on the market, resulting in a dramatic reduction in energy use. As a company, Bosch is committed to exceeding EnergyStar standards and encouraging solar technology. A quick search also shows there have been no recent concerns with their labor practices. Although much of their attractiveness to the team comes from their willingness to donate thousands of dollars in appliances, they are still an ethical choice as a supplier.

Thanks to the team's commitment to energy savings and affordability, they have chosen appliances that have the embedded ethical benefit of reducing energy consumption in an innovative way that is accessible to their target market.