



Urban Single Family  
**Project Summary**

The goal of the project is to design a Net Zero Energy home that is affordable for the targeted market. “Oasis abode” an urban single family home in the hot and dry climate will achieve zero water discharge to respond to water scarcity in Jaipur, Rajasthan in India. The increased level of PM2.5 and PM10 outdoors requires us to resolve the challenge of a mixed-mode building while maintaining the superior indoor air quality.



Figure 1 Oasis Abode Conceptual

**Relevance of Project to the Goals of the Competition**

A net-zero residence fits perfectly in the Indian context given shortage of grid-supplied energy evidenced by frequent brownouts in most cities in the country. India’s Paris Accord commitment includes producing 40% of all electricity from non-fossil sources. The scarcity of land in India, depleting ground water levels, and degraded air quality make this design very relevant to future development in tropical regions around the world that are experiencing economic growth. Jaipur’s climate is similar to that of Phoenix, Arizona and both fall under climate zone 2B in International Energy Conservation Code (IECC). The design meets U.S.DOE Zero Energy Ready home criteria, IECC-2015 criteria and SVA-GRIHA (a green building rating system - India).

**Design Strategy and Key Points**

Zero water discharge with rain water harvesting, water conservation, recycling, and a water conserving landscape is a huge priority for our team.

Our team embodies integrated design and the design combines passive and active strategies to respond to the macro climate. Incorporating the principles of Vastu shastra, an ancient Indian system of laying out cities and homes, gives our project acceptability and high marketability value.

Table 1 Project data & Targeted Technical Specifications

<b>Location</b>	Jaipur, Rajasthan	<b>Wall Insulation (U-Factor)</b>	0.79 W/m <sup>2</sup> K (0.13 Btu/h.°F.ft <sup>2</sup> )
<b>Climate zone</b>	IECC zone 2B: Hot and Dry	<b>Roof Insulation (U-Factor)</b>	0.16 W/m <sup>2</sup> K (0.02 Btu/h.°F.ft <sup>2</sup> )
<b>Building Area</b>	222.7m <sup>2</sup> (2397 ft <sup>2</sup> )	<b>Window Performance (U-Factor &amp; SHGC)</b>	1.63 W/m <sup>2</sup> K (0.28 Btu/h.°F.ft <sup>2</sup> ) & 0.24 (SHGC)
<b>Number of stories</b>	2 (G+1)	<b>HVAC system (VRF system)</b>	VRF SEER: 22.6
<b>Number of Bedrooms</b>	4	<b>Energy Recovery Ventilator (ERV)</b>	Efficiency: 76.5% MERV Filter: 16
<b>Number of Bathrooms</b>	3	<b>Equipment Power Density (EPD)</b>	12.5 W/m <sup>2</sup> (3.96 Btu/h.ft <sup>2</sup> )
<b>Estimated monthly energy cost</b>	\$10/ month (\$0 for electricity for net zero home and \$10 for cooking LPG gas)	<b>Lighting Power Density (LPD)</b>	2 W/m <sup>2</sup> (0.53 Btu/h.ft <sup>2</sup> )
		<b>EUI (Without Photovoltaic panels)</b>	20 kWh/m <sup>2</sup> /year (63.2 kBtu/ ft <sup>2</sup> /yr)