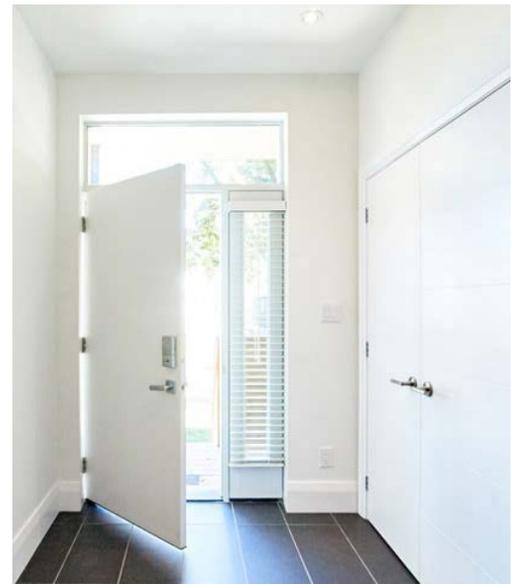


January 2015

When our clients Suresh and Athena came to us, they had begun to outgrow their small, East Toronto bungalow and wanted to pursue their dream of a well-designed, extremely energy-efficient home. We were excited to work with them to design their new, two-storey home using passive and active solar systems and an extremely insulated and air-tight envelope. With our [Melodie Coneybear](#) at the helm and [ProICF](#) as the builder, the resulting home is beautiful, generates electricity and scores 85 on the [EnerGuide](#) scale!



## Active Solar System:

Along with the Solares practice of designing to passive solar principles, [Pape Village](#) has an active rooftop solar array. The PV panels are part of a 5-kW system that is connected to the provincial [MicroFit](#) electricity buy-back program. With no battery storage on site, all the excess energy they produce from the roof is fed back into the grid for a profit.

This PV system is designed so that each panel has a micro-inverter on the back that can be individually monitored and optimized. Generated electricity goes to the mechanical room ready to be used right away, and if efficiency drops (due to blow-on leaves for example), they can know exactly which panels are affected and remedy it right away. There's also an online dashboard, so Suresh and Athena can keep in check with their system from wherever they are!

The numbers from their MicroFit participation are very encouraging. From their program start in late-March 2014 until the end of December, they generated 4,759 kWh. That electricity was fed back into the grid in exchange for a monthly cheque, which has already amounted to over \$2,500!

## Return on Investment:

You might be asking, "What is the return on investment?" We talked to [Sherwin Akhavi](#) of [BlueGreen Consulting Group](#) with just that question. Sherwin did all the energy and air-tightness testing for this home, and has a great sense of the project. He calculated their annual return on investment using their initial investment amount of about \$22,500 before tax, their MicroFit numbers to date, and climate data for their first eight months in the program.

With the revenue Suresh and Athena receive from MicroFit, the system will have paid for itself in just 7.4 years. That equates to a 14% rate of return, and – if the available solar radiation in the coming years is the same as the first eight months – will yield a cumulative 20-year net profit of \$35,632!\* We think those are very good figures compared to other investment options out there.

\*Sherwin's calculations are based on real data for their first eight months in the program, along with 4 months of forecasted data (since we don't yet have real data for a full year). These first eight months showed 10% less available solar radiation than average. Therefore, keep in mind that if the coming years turn out to be in line with the average of the past 30 years, the rate of return would jump higher and the system could pay for itself in less time. Also, the cumulative net profit is calculated for 20 years to match MicroFit's 20-year



contract terms. The system will continue to yield a profit after that time has passed, but the rates are yet to be determined by the Province.

### Energy Efficiency and Incredible Air Tightness:

In addition to passive and active solar systems, Suresh and Athena's house also uses triple-glazed fiberglass windows, in-floor radiant heating, ductless mini-splits for air-conditioning, an [Ultimate Air ERV](#) for ventilation, lots of ceiling fans for good circulation, LED lighting for all pot lights and compact fluorescents for the rest. The plumbing system uses a [PowerPipe](#) (like in [Our House](#)), which channels the heat from used shower drain water to preheat hot water used elsewhere in the house. The home is also roughed in for a future greywater system, and all fixtures are low-flow units by [Riobel](#).

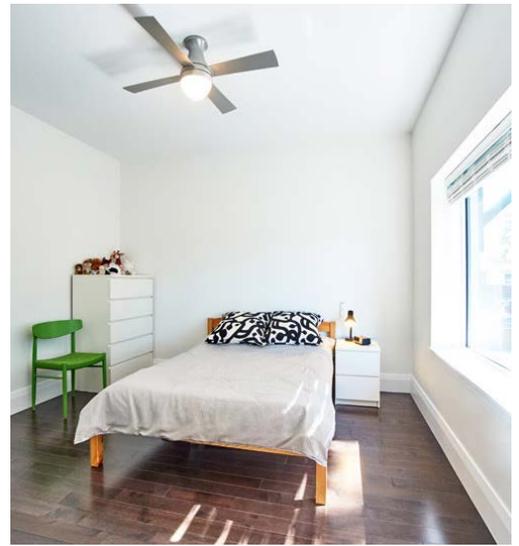
Pape Village is Solares' first [Amvic ICF](#) house. We've used [Durisol](#) blocks before, but Amvic 3.3 ICF blocks are a bit different. A layered block construction like Durisol's, for instance, would have 2 3/8" of [EPS](#) foam on each side of the core, while the Amvic 3.3 ICF block used in Pape Village has 3 1/4" on each side, bringing this wall type's insulation value from R22 to R30.

ICF is considered a premium construction material, in contrast to stick frame for example. The benefit, however, is that you can get a very air-tight home with an all-in-one vapour and air barrier – both factors that contribute to extremely energy efficient homes. The slightly increased construction cost incurred by the material was well worth it.

The insulation values of this house are high, with R30 in the walls and basement, R20 in the basement slab, and R56 in the roof. The roof is made using 6" of spray-foam insulation and 3" of [polyisocyanurate](#), making for a highly insulated assembly. **With all these strategies, Pape Village achieved one of our best air-tightness ratings yet: a mere 1.05 air changes per hour!**

### Design and Interiors:

Suresh and Athena wanted to use the property they already had and gain more space than their small bungalow allowed, which meant they needed an extra story on virtually the same footprint. The new home's flat roof and rectangular shape allowed us to maximize floor area (850 sq.ft. per floor) while keeping within municipal height regulations. Floor heights are generous, with 9-foot ceilings on the main and second floors, and an 8-foot ceiling in the walk-out basement. The basement is roughed in for a separate 2-bedroom suite, and with three bedrooms upstairs this is essentially a 5-bedroom house.



The front entrance on the main floor links with a spacious home office at the front, and then opens onto a large kitchen-living-dining space. This rear, south-facing family zone is the focal point of the house, and looks out over the backyard through an expansive floor-to-ceiling window with exterior shading.

The second floor accommodates three full-size bedrooms (one ensuite), a family washroom, and a laundry area separated from the hallway by a large sliding wall. The interiors include low-VOC paint, matte ceramic floor tiles from [Olympia Tile](#), and a custom kitchen by [Kitchens by Julie](#). Exterior finishes include cement board on the side and rear, with a beautiful grey brick on the front façade.

We feel so fortunate to have worked with Suresh and Athena to build their dream home, and we wish them many years there of happiness and thermal comfort with family and friends!

*For more information about [Solares Architecture](#) and our sustainable home projects visit us at [www.solares.ca](http://www.solares.ca).*

*For the past 13 years, our friends at [BlueGreen Consulting Group](#) have been offering turnkey, energy-efficiency diagnostic services for vintage and new homes in the GTA. We love working with them to test and measure our projects!*

