



Canada Wood
Produits de bois canadien



CASE STUDY



Chinese Technology Transfer: Adapting High Performance Wood-Frame Super-E® Methodology to Townhouse Construction in North China

INTRODUCTION

The Canada Wood Group (CWG) is an initiative of Canadian forest industry which seeks to develop new markets for Canadian wood products in offshore markets. It receives funding support from the federal government and various provinces which supplement industry monies.

CWG has been actively working in China since 2003 to introduce wood frame construction as an option to conventional concrete and steel methods. In part to reduce pollution and to lower the environmental impact of building, China's central government have mandated policies to tighten energy efficiency and reduce carbon emissions. By 2030 authorities intend to require that all new buildings perform to Near Net Zero Energy (NNZE) levels and zero energy by 2034. Wood construction readily provides passive energy conservation and can be further supplemented by technology to achieve ultra low performance.

CWG partnered with a major Chinese developer BSD-TEDA in Tianjin to build 100 wood-frame townhouses to meet Canadian 'Super-E®' ultra low energy levels of performance. The three storey townhouses covered 16,700 m².

While a commercial project, the developer required outside expertise and support to execute enhanced construction techniques. Canada Wood supported the project to create a demonstration of wood systems achieving ultra-low energy conservation levels to encourage the Chinese government and the building industry to use more wood in construction.



100 Super E®
Wood Frame
Units



Annual
Heating
Saved



Annual
Power
Saved



Largest com-
plex adopting
Canadian
energy efficient
technology

Location Tianjin Binhai New Area, China

Developer BSD-TEDA (Tianjin) Construction Development

Designer Tianjin Architectural Design Institute (TADI)

General Contractor China Construction Eighth Engineering Division

Builder Tianjin TMJD Low Carbon Residential Technology Development

Super E® Consultant Agent & Staff EEEA, Canada.
Jeff Culp, Ken Klassen, Jack Zhou.

CW Major Staff Steve Ross, Haiyan Zhang, Jason Li, Weizhou Fu, George Yang, Robert Wildschutte, Ge Beiqing, Meng Xi

Construction Schedule Started in January 2017, completed in September 2018, and completed the air tightness test of Super E in early 2019



PROJECT DESCRIPTION

The project is located within the Sino-Canada Eco-district, a co-branded initiative of NRCan and BSD-TEDA. The large-scale development showcases wood building in various forms including light wood frame, hybrid systems and mass timber. 300 townhouses were slated to be built in light wood-frame construction and approximately 200 are complete.

BSD-TEDA decided to design 100 units to Canada's Super-E[®] specification (export version of the R-2000 spec) in order to offer the market an enhanced, green form of housing. The vast majority of low-rise construction in China is in concrete. The Super-E[®] method combines highly insulated assemblies with high airtightness, energy efficient doors and windows plus mechanical systems using heat recovery ventilators (HRV) to minimize energy consumption.



RESULT

CWG involved Winnipeg-based Energy Efficient Exporters Alliance (EEEA) to assist with energy modelling using Hot 2000 software, training and quality assurance site visits. CW engineers supported the developer's design institute in adapting the architectural layouts (originally envisaged as concrete structures) to light wood-frame construction. CW also reviewed structural integrity and building durability, provided solutions for difficult assemblies and produced structural models and drawings for Super-E®. CWG's own China-based construction specialists conveyed day-to-day guidance to the builder and also ensured that the wood-framing itself was done to a high standard.

In addition to using Canadian softwood lumber and oriented strandboard, the project also utilized HRV's manufactured by Nu-Air Ventilation Inc. an HVAC manufacturer based in Windsor, Nova Scotia. Including NRcan's support for the tech transfer (approx. 3%), total investment in the 100 unit project exceeded \$4.8 million.

After verifying via Hot 2000 that the design would meet Super-E® criteria, EEEA and CW construction specialists devoted considerable time to training the builder's site team to properly install insulation and achieve airtightness levels using the air-tight drywall method. Blower door testing was used to evaluate the airtightness of each unit. The builder became increasingly proficient as the project rolled on.

In order to mitigate winter-related air pollution in the Tianjin region, the local government mandated a 3 month stop-work order on all construction in the province. In practice this meant that construction was halted. However interior fitting-out and finishing continued within semi-completed units. A 'lesson learned' for CWG was the necessity to maintain tight control of subtrades throughout the standstill. Unsupervised plumbers and electricians set back the project after they bored many penetrations through previously airtight envelopes. This later required extensive remediation to bring the units back to Super-E standards.

Following this remediation work, EEEA inspectors visited the project, conducted a battery of checks and tests and officially certified all 100 units to the Super-E standard.

Energy consumption of each Super-E® house will be greatly reduced over standard construction. Annual energy usage will be 30% - 40% lower. Heating costs will be halved.



NEXT STEPS

After this successful demonstration of ultra-low energy wood construction on a large scale project, Canada Wood has continued to work with Chinese authorities and industry to introduce energy efficient and greenhouse gas saving technologies to China. In early 2020 we engaged in the design and construction of a near net zero (NNZ) dormitory in Changzhou, Jiangsu Province. We are also helping to develop a NNZ wood construction standard for China through cooperation with the Chinese Academy of Building Research.

MAJOR EVENTS



■
Chen Yimin, Chief Engineer of MOHURD Led a group visit to the Sino-Canadian Ecological Demonstration area on Mar. 2, 2017



■
Former Minister Jim Carr (NRCan), Former Ambassador John McCallum visit the Sino-Canadian Ecological Demonstration area on June 9th ,2017



■
Members of China Civil Engineers Society visited BSD-TEDA Townhouse Project on April 21 , 2017



■
Mary Ng MP – Minister of Small Business and Export Promotion visited the project

This project is made possible by the funding from Natural Resources Canada

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