Masa Noguchi
ZEMCH Network Founder
ZEMCH 2012 Conference Initiator
Mass Custom Homes
Multi-family Community Design Proposal
Sekisui Chemical Co., 2003

Mass Custom Design™ Approach to the Delivery of Quality Affordable Housing
http://www.masscustomhome.com

Mass custom home® models
Mass Custom Design Communication Tool Development

User choice of standardised housing design components towards mass customisation of housing
Canadian Solar Decathlon 2005
PV Mass Custom Home Prototype
Concordia University, Montreal
Industry Aspirations for Building Integrated Photovoltaic Thermal Heat Recovery Systems

Dr Masa Noguchi
Mackintosh School of Architecture, Glasgow School of Art

The International Energy Agency indicates energy use in buildings worldwide accounts for over 40% of primary energy use and 34% of greenhouse gas emissions. Energy use and emissions should include both direct, on-site use of fossil fuels as well as indirect use from electricity, district heating/cooling systems and embodied energy in construction materials. National Housing Federation claims that housing in the United Kingdom (UK) is responsible for 27% of carbon dioxide (CO₂) emissions. In particular, Scottish homes today are conspicuous energy consumers emitting on average 3 ton-CO₂ per house annually which is much higher than the UK average of 2.75 ton-CO₂. The UK’s fuel poverty issue is on the rise. In fact, 28.5% of households in Scotland alone live in fuel poverty according to Scottish House Condition Survey 2008. In order to encourage the house-building industry to move towards the mass delivery of eco-friendly houses, the Code for Sustainable Homes was introduced in 2006.

Following the code, the UK government now expect the industry to achieve their bold zero-carbon housing target by 2016. Despite the policy, the housebuilding industry today is barely ready for accomplishment of such sustainable housing agenda. Given the national and international challenges related to climate change and resource shortages, much more is required than incremental increases in houses’ energy efficiency.

To take the initiative to meet the societal needs, governmental expectations and industrial obligations, ROBERTRYAN Homes is currently developing design ideas and solutions towards the construction of zero-energy healthy houses. The housing prototype has been called Z-en house aiming to achieve the net zero energy housing consumption in view of the UK government’s recognised Standard Assessment Procedure (Fig.1).

The construction site has carefully been selected in combination of the solar access and sun shading potentials. The large south facing windows to be installed in the house also contribute to optimising the use of natural light and solar gains (Fig.2). The Z-en house is a single detached home to be built in a new rural residential development in West Kilmarnock, Scotland. The floor area of this house is approx. 345m² excluding the basement floor area and the exposed wall area was estimated at 275m². The house contains 4 bedrooms and a study and semi-private spaces, such as a kitchen, dining room, lounge, and purposeful family room, are on the ground floor. A basement is also introduced to the project, designed to serve as a multifunctional space in which thermal mass components are installed and so as to capture heat from the sun and active hybrid renewable energy technologies including the BIPVT CM system which is relatively new to the housebuilding industry in the UK (Fig.3).

Z-en House
Design Proposal
Robert Ryan Homes
North Ayrshire
Scotland
2010
ZEMCH 109
Design Development for Planning Application
Prestwick, Scotland
ECOTERRA House: Canada's First Zero Energy Mass Custom Home