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SUSTAINABLE ARCHITECTURE IN THE 21ST CENTURY

The Swiss Solar Prize is truly unique. It is an indication of the unremitting dedication to solar energy and sustainable architectural technologies within Switzerland. Crucially, the prize not only considers the environmental performance of buildings, but also considers the essential problem of how sustainable technologies can be an integral part of good architectural design and practice.

I have always argued for the importance of sustainable design. It is essential that we take a holistic design approach that considers all aspects of a project – from the totality to the smallest detail – and the effect that each has on the others. Sustainable design means doing the most with the least means. Following the logic of ‘less is more,’ it employs passive architectural means to reduce energy consumption, minimising the use of non-renewable fuel and reducing the amount of pollution. According to the Energy Information Administration, world energy consumption is projected to increase by 57% from 2002 to 2025. All indicators point to non-renewable energies – oil, gas, uranium – running out by the end of the century. At the same time, the price of oil recently peaked at US\$ 70 per barrel, a 500% increase since 1999. In an industrialised society, buildings account for up to half of the total energy consumption – so the necessity of designing environmentally sustainable buildings is obvious.

Responsible sustainable design is not simply about individual buildings – it should be implemented at all scales. It was Buckminster Fuller who graphically showed us how closely linked the built environment is with our planet’s ecosystem. By understanding these relationships, we can design buildings that use passive and active measures to increase energy efficiency and reduce the ecological impact. These technologies not only have environmental benefits, but also intrinsic architectural qualities. We need to change the public perception of sustainable architecture as something that is aesthetically compro-

mised. For example, the generous use of natural light not only humanises our buildings, giving them a poetic dimension, but it is also – in the form of solar energy – an invaluable resource. To paraphrase Le Corbusier’s famous definition of architecture, you could argue that in addition to “the play of forms in light,” sustainable architecture is the “magnificent play of forms with light.”

An example of this holistic approach to design, rejuvenating old build stock with contemporary technologies is the new German Parliament at the Reichstag. The energy strategy we pursued in this project is truly radical. It uses renewable bio-fuel – refined vegetable oil – which when burned in a cogenerator to produce electricity is far cleaner than fossil fuels. The result is an enormous reduction in carbon dioxide emissions. Surplus heat is stored as hot water in an aquifer 300 metres below ground, and can be pumped up to heat the building or to drive an absorption cooling plant to produce chilled water. This, too, can be similarly stored below ground. These modest energy requirements allow the building to perform as a power station for the new government quarter. The Reichstag’s cupola is also crucial to its lighting and ventilation strategies. At its core a ‘light sculptor’ reflects horizon light into the chamber, with a moveable sun-shield blocking solar gain and glare. As night falls, this process is reversed. The cupola then becomes a beacon of German democracy.

At the other end of the scale, our project for the Chesa Futura – an apartment building in St. Moritz – is an environmentally sensitive building, which combined state-of-the-art computer technology with centuries-old construction techniques. Although its form is novel, the building is framed and clad in timber – one of the oldest and most sustainable building materials. The 250,000 larch shingles colour naturally as they are exposed to the elements, and will last for a hundred years without the need for maintenance. Furthermo-

re, timber is a renewable resource; the trees absorb carbon dioxide as they grow; felling older trees reinforces the foresting practice of harvesting to encourage regeneration; and by using locally cut timber, little energy is consumed in its transportation.

The building responds to its location and local weather patterns, with its bubble-like form allowing windows and balconies on the southern side to open up to the sunlight and panoramic views, while the colder, north facade is more closed, punctuated with deep window openings in the Engadin tradition. Taken overall, Chesa Futura (literally, ‘house of the future’) might be regarded as a mini manifesto for architecture, not just here but in other parts of the world. It shows how new buildings can be inserted into the existing built environment, while sustaining indigenous building techniques and preserving the natural environment.

Architects, designers and planners cannot continue to ignore the damage our buildings inflict on the natural environment. As the consequences of our past inaction become ever more apparent, designing for a sustainable future becomes a necessity, not a choice. The way we shape our buildings, our neighbourhoods and our global lifestyles has now become even more important than ever – we must ensure that sustainability becomes as inseparable from our design processes as time, cost and quality.