SMART BUILDINGS

Newcastle City Council

ENERGY SMART BUILDINGS AND INFRASTRUCTURES ENABLING A HIGH QUALITY OF LIFE AND THRIVING ECONOMY IN NEWCASTLE 2050

In 2050, people in Newcastle enjoy energy-efficient buildings with a high level of comfort. All homes and non-domestic buildings are connected to an effective energy system, to achieve net-zero energy consumption and net-zero emission.

Newcastle has adopted a collective approach to decisions in the infrastructure that enables joint decision-making with stakeholders in the city. Urban planning takes a broad wide-area view to take full advantages of the opportunities extending beyond site or estate boundaries and city limits. Through the open data centre the City Council and its partners are able to implement evidence-based policies and decision-making. Residents are empowered and have the means and the wish to make responsible choices on their own energy usage and investments.

Sustainable buildings

Homes and non-domestic buildings provide high levels of comfort with sustainable energy solutions. They support their users with personalised advice to save energy in line with their lifestyles. Retrofit solutions as well as new innovative buildings ensure that all buildings are sustainable. Buildings are exemplary in their use of innovative and sustainable technologies. High visibility of the solutions supports their adoption as well as a thriving building sector that 'exports' design and consulting services. In this way the standard of the buildings is raised, adding value to existing business models in the local community.

Smart infrastructures

Infrastructure interconnects local grids for different energy sources, such as electricity, temperature control (heating and cooling), water and data, and connect the local grids to regional and national levels. Local grids enable communities to invest in and share sustainable solutions with peers, and support optimal use of renewable energy and the specific features and qualities of separate buildings. All buildings are connected to the grid, receiving and transmitting information to peers or to a wider network with respect for the privacy of the users.

The top layer of the visual represents different type of buildings and sharing options, with an increasing complexity of the solutions. This builds up from a (perfect) house, connected within the neighbourhood, through a community hub around a (public) building, shared use and modular buildings, right up to the future living environment.

At the bottom left the new policy and planning process are shown as a way to manage future-proofing. Elements of the desired future scenario here are the flow of benefits between stakeholders, and city-wide planning (around the table) to align information and decision-making.

At the right of the visual are the underlying infrastructure and personal schemes, which are needed to enable all the other solutions.

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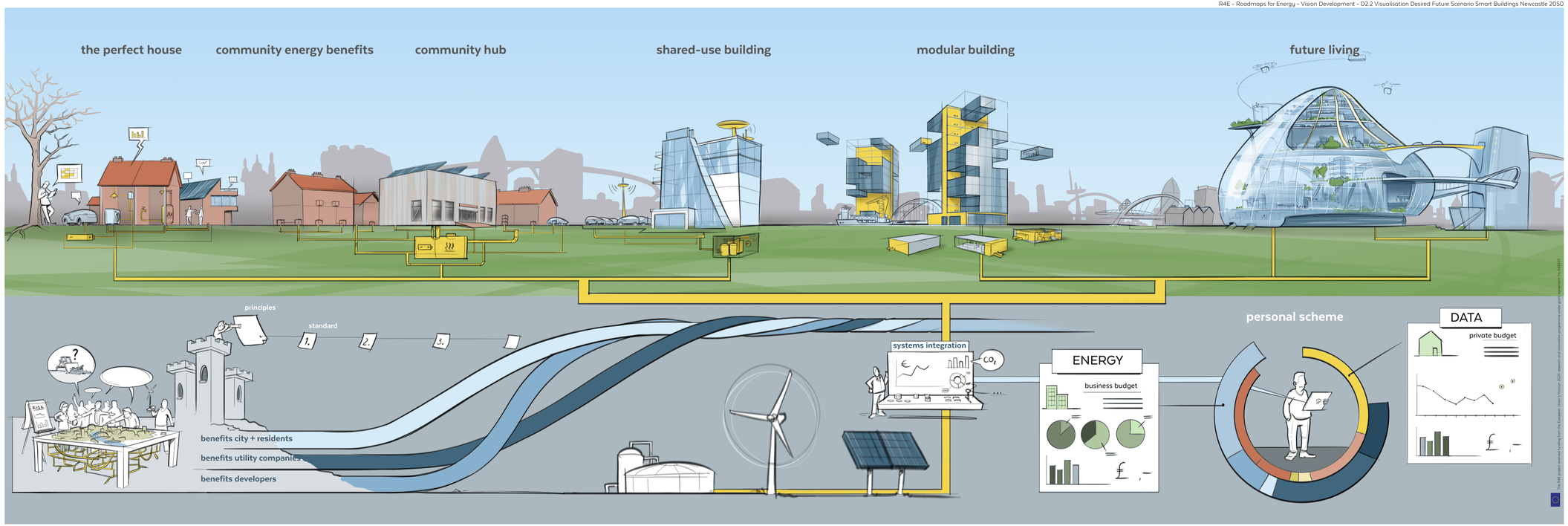

Flow of benefits

An integrated planning and development process optimises the flow of benefits for different stakeholders. The value of 'community gain' is considered (not just financial gain) is considered through local integration. A long-term perspective allows business models and decision making to consider state-of-the-art solutions and to avoid the need for renovation. Democratic decision-making enables future retrofitting with participation by residents.

City-wide planning

Policy-making and planning in Newcastle are based on a city-wide plan. This fully integrates all assets and their interactions, so the total impact on the surrounding can be considered. A collaborative approach together with all stakeholders drives alignment of information and leads to better decisions. Through regional cooperation, one set of principles provides developers with progressive standards to achieve sustainable projects.

The perfect house

Houses are designed for people. Connectivity with the energy and data net provides valuable services for comfortable living (e.g. tele-care). People can make responsible choices, even from options they did not think of themselves. The smart house manages itself according to set parameters. Simplicity and accessibility are the norm: people have freedom of choice, with full control oftheir homes and their lives.

Community energy benefits

People living in Newcastle's estates jointly benefit from shared sustainable resources provided through local grid solutions. Residents share energy solutions tailored to their homes (e.g. PV panels on south-facing roofs, or turbines in 'windy gardens', with basement for batteries). The grid provides local interconnectivity promoting community-building and cultural change.

Community hubs

Residents, businesses and public organisations share energy through a two-way interactive local grid. This increases resilience, benefitting from the strengths of the features and investments in other buildings. The benefits of energy investments and production are retained within the community. A smart (virtual) infrastructure allows matching of fluctuations in energy supply and demand of energy.

Shared-use buildings

Smart (wireless) systems enable flexible use of buildings with variable occupancy patterns and users' needs. Office buildings, shopping centres, community buildings and schools can meet varying demands for space by providing the required energy, lighting and heating according to specific user and activity profiles. The building minimises energy consumption by recognising recurring patterns of use.

Modular buildings

Modular buildings offer smart systems, increasing flexibility for reconfiguration of spaces and energy systems (biomass boilers, heat pumps, PV modules). Smart building controls enable internal restructuring. Flexibility de-risks the business case for investors to make the building structures future-proof. Newcastle can exploit its heritage of building large ships and offshore structures to develop core structures that can be clad with modules.

Future living

Citizens' daily living patters have changed significantly. Buildings suit the activities of future citizens, with flexibility between working, living and leisure activities. Future buildings offer a range of facilities and technologies to encourage social interaction.

Personal energy schemes

Individual energy schemes with personal roaming profiles allow the use of (wireless) energy and data where and when they are needed. These provide access to new services such as telecare or energy donations. The scheme enables localised trading, sharing and lending of resources through peer-to-peer networks. The scheme addresses different lifestyles and provides individual budgets and advice for behaviour based on planned and predicted usage.

Energy infrastructure

The energy infrastructure enables gradual replacement of non-sustainable energy sources by renewable energy in buildings as well as regionally (e.g. wind parks and solar farms). Optimisations are done at the appropriate levels, linking local, regional and national grids. Shared data and knowledge from all stakeholders feed into the city-wide plan and support future-proof decision-making. In 2050, Newcastle is a net-zero emissions city.

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ROADMAPS FOR ENERGY