Energy storage technologies armenia

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IEA (2020), Energy Efficient Buildings in Armenia: A Roadmap, IEA, Paris https://, Licence: CC BY 4.0

Energy-efficient technologies and materials can be widely deployed given, among other conditions, the right governance and policy environments, functioning markets and access to financing. This section explores approaches to expand the deployment of energy-efficient technologies in Armenia"s buildings, beginning with envelopes and whole-building retrofits. It provides insights and recommendations, including for cooling, which is one of the fastest-growing sources of energy consumption both in Armenia and globally.

Armenia faces significant obstacles to comprehensively retrofitting entire buildings including their envelopes (i.e. external walls, insulation, windows, doors, etc.), particularly for the many MABs in cities such as Yerevan. Due to the poor condition of many buildings, basic structural repairs may be needed before an energy efficiency intervention is logical or feasible (Econoler, 2015).

Armenia is not alone in the challenge of scaling up and replicating building efficiency retrofits. While many individual projects have proven the cost-effectiveness of "deep" building renovations,most countries are not at the stage at which these kinds of retrofits are commonplace.

In addition to technical and structural challenges - and market and financial barriers - successful energy efficiency interventions in whole buildings can involve a long list of stakeholders, including the owners of the buildings and/or individual apartments, installers and lenders. Ensuring that all these stakeholders work together on one or more whole-building efficiency projects is not always easy.

In Armenia, stakeholders involved in achieving whole-building retrofits include households (e.g. apartment owners and tenants); HOAs and HMCs; suppliers and installers (including energy auditors and other professionals); LFIs and IFIs; local governments; and energy providers.

Despite the complexities involved, envelope improvements and partial building retrofits are achievable through targeted engagement with key stakeholders, as illustrated by the REELIH project. In addition, nearly half of Armenia"s housing stock was built during 1951-75 and 40% was constructed between 1976 and 1995. Only a small portion (around 7%) was constructed following the mid-1990s (EDRC, 2015). This suggests there may be potential to scale up and replicate structural repair programmes and/or envelope efficiency improvements systematically for many buildings of similar age and characteristics (i.e. construction profile).

One initiative that has employed precisely this kind of programmatic approach to building efficiency retrofits (including exterior wall improvements) is known as Energiesprong. Using prefabricated facades, carefully

selected and efficient heating and cooling equipment, and insulated and solar photovoltaic (PV)-equipped roofing materials, Energiesprong has demonstrated the feasibility of retrofitting entire neighbourhoods at one time rather than targeting buildings individually (Energiesprong, 2020).

Given the differences in economic indicators, condition and type of buildings, etc., between Armenia and the Netherlands (or other EU countries and US states), policy makers may question whether the Energiesprong approach is feasible for Armenia. While specific technologies and methods would likely differ given Armenia"s local requirements, some of the Energiesprong model"s non-technological aspects may be relevant.

One of these is the business model itself, which is based on a repayment scheme wherein homeowners do not incur additional or upfront costs. Instead, the refurbishment cost is paid over a 30-year period through lower energy bills, factoring in budgets for planned maintenance and repairs. The model also works through HOAs, with homeowners paying Energiesprong via their HOA through a service charge that is equivalent to their regular payments for energy, maintenance and repairs (Energiesprong, 2020).

Including maintenance and repair in a residential building-efficiency business model may be particularly advantageous for Armenia. A repayment model based solely on energy savings - even over a long time period - would likely be insufficient to cover the potentially significant repair and refurbishment costs of the country"s buildings. Integrating efficiency investments with the estimated USD 200 million Armenia spends annually on the upkeep of public buildings and social housing could be doubly beneficial.