



AKDN Budget Guidelines: Green Buildings

July 2021

Executive Summary

In the last year, the climate agenda in AKDN has progressed substantially. Two of the most prominent developments are 1) Establishment of GHG emissions accounting system across AKDN, revealing >80% of direct emissions are from energy use in buildings; and 2) AKDN's commitment to reach net zero carbon emissions from its operations well before 2030.

In light of these developments, AKDN Budget Guidelines for Green Buildings are being strengthened and elaborated, to introduce de-carbonization targets for building stock and provide actionable guidelines for agencies to budget for and implement emission reduction measures. Construction focal points of all AKDN agencies have been consulted in the update of the document. The main developments in the Budget Guidelines for Green Buildings are summarised below:

New buildings:

- Developed a standard *Green ToR Section* to be included in the ToR (or design brief) for new construction projects, including a greater level of detail of green requirements for each project.
- 5M USD construction budget threshold for projects, which must achieve zero-carbon design.
- 1M USD construction budget threshold for mandatory building certification (EDGE Advanced).

Existing buildings:

- Requirement for energy data management at each facility.
- Requirement for energy audits at facilities with above Agencies' average energy intensity. Audits to be renewed every 5 years.
- Minimum criteria for energy audits.
- Requirement for mandatory implementation of audit's recommendations within four years – all measures with payback of 10 years or less.
- Requirements to phase out use of generators, except where a sustainable alternative is not feasible.
- Requirement to retrofit annually at least 5% of Agencies' total floor area to zero-carbon standard, in line with science-based targets.

Scope: GHG emissions from all new and existing buildings.

Timeframes

- For the preparation of 2022 budget and beyond.
- All guidelines for new buildings: Effective from September 2021.
- Energy audits: to be renewed every 5 years.
- Implementation of efficiency measures with <10 years payback: within 4 years of audit.
- 5% of each Agency's total floor space to be zero carbon each year, effective from 2023.

Next steps:

- a) Approval request: The ECC is requested to approve the updated Budget Guidelines for Green Buildings and disseminate to all Agencies and Institutions for use in budget preparation.

- b) Recommendation: It is recommended that the current informal inter-agency group on green construction is transitioned to an AKDN peer review panel. The panel would support new construction projects with the implementation of the green guidelines and should have a role to approve departures. This can be part of the newly approved inter-agency construction advisory committee, anchored by AKAH. The consolidation of green construction and construction core standards under one umbrella would be more effective in responding to the ECC's guidance and direction.

Introduction

1. This document provides guidelines for AKDN Agencies to help them incorporate climate change considerations in their 2022 budget and longer-term planning, with a focus on green buildings.

Scope and Aim

2. These guidelines for AKDN Agencies refer to the environmental sustainability of buildings, covering:
 - Planned construction of new facilities; and
 - Operation and maintenance (O&M) of existing facilities: energy use; water use; waste management.
3. The aim of these guidelines is to help Agencies reduce their carbon footprint from buildings. It is expected that in most cases this will result in O&M cost savings and hence a reduction in the whole-life cost. However, introducing operational efficiencies may require an initial capital expense, which needs to be factored into budgets for new projects and O&M of existing buildings.

Timeframes

4. These guidelines should be used by AKDN agencies in the preparation of their 2022 budgets, as well as future budgeting processes. Further detail on timeframes for implementation for specific measures is included in the body of the guidelines.

Part 1: New Facilities Construction

5. During planning and design for new facilities, there is an opportunity to embed green principles in the heart of projects. Done in the earliest stages of a project, this can result in substantial reduction in greenhouse gas (GHG) emissions over the lifecycle of a building and **reduced whole-life cost**.
6. Table 1 provides a summary of proposed Minimum Green Standards for new AKDN buildings.

Table 1 Minimum Green Standards for new AKDN buildings

Construction Budget	Minimum Standard	Is Certification Required?
Less than \$1M	EDGE Advanced ¹	No
Over \$1M Less than \$5M	EDGE Advanced ¹	Yes
Over \$5M	EDGE Zero Carbon ²	Yes

7. All new projects going into design should include the standard AKDN environmental section as part of the project Design Brief – see Appendix A. Project briefs for the design of new buildings should include the requirement for an environmental deliverable in line with the Green Building Guidelines. Projects should allocate budget for the environmental discipline and deliverable.

¹ EDGE Advanced requires: 20% reduction in annual water use; 20% reduction in embodied energy in materials; 40% reduction in annual energy use.

² EDGE Zero Carbon requires that the building meets EDGE Advanced. In addition, all energy demands from the building are to be met by renewable energy.

8. An AKDN-wide minimum green standard for all new buildings is proposed. For projects with a construction budget under \$5M this is equivalent to achieving EDGE Advanced¹ performance, which is as follows:
 - 40% reduction in operational energy use
 - 20% reduction in water use
 - 20% reduction in embodied energy of construction materials.
9. For projects with a construction budget under \$1M obtaining formal certification is not mandatory. Larger projects should make an allowance in the budget for certification. Certification costs vary with project complexity, with an average of approx. \$10k.
10. Larger projects, with a construction budget over \$5M, should reach a Zero Carbon^{Error! Bookmark not defined.} level, where all residual energy demand for the building is met through renewable energy. Carbon offsets and credits are not acceptable to reach EDGE Net Zero status.
11. To support their efforts to meet the green standards in *Table 1*, Agencies should follow the AKDN draft Green Building Checklist when planning for new facilities. The Green Building Checklist provides advice on the approach to achieve the minimum green standards from Table 1 and improve the environmental performance of new buildings.
12. AKAH can provide support with the application of IFC EDGE tool to projects as a tool for confirming minimum green standards are being met.
13. Any cost-benefit analysis done by the project or implementing agency should be done on a whole-life cost and benefits basis.
14. Exceptions to any of the clauses for new projects are possible where a review by the inter-agency design peer review panel concludes that meeting these requirements is not technically feasible.

Part 2: Existing Facilities

15. Energy use in existing facilities has a large impact on AKDN's GHG emissions: in 2020, it accounted for 85% of AKDN's Scope 1 and 2 GHG emissions and for 50% of the total emissions. All AKDN Agencies therefore should take active steps to increase energy efficiency and deploy renewable energy to reduce carbon footprint of their facilities.

Energy Management

16. Each Agency is required to put in place an internal system of energy management (EMS) in line with international best practices, including:
 - a) appoint a dedicated Energy Manager³ for each facility.
 - b) maintain a data-base with information about each facility's energy consumption and profile, including energy consumption (kWh), energy intensity⁴ (kWh/m²) and carbon intensity⁴ (kgCO₂e/m²). **Carbon intensity** is relative measure of the facility's carbon footprint expressed in kgCO₂e per m² or another metric for normalising carbon emissions for the facility (e.g. per occupied bed for hotels). Facility's energy related GHG emissions from Scope 1 and 2 shall be used to determine its carbon footprint. Each Agency shall determine and report the **average level of carbon intensity** of its facilities as part of GHG emission dashboard.
 - c) establishing energy efficiency (EE) targets in line with Agency's and AKDN-wide science-based targets for GHG emission reductions.
 - d) systematic identification and implementation of low-cost energy conservation measures.
17. AKAH will serve as a source of expertise, guidance and internal capacity buildings for AKDN Agencies on Energy Management and Energy Management Information System.
18. In addition, buildings with heating, cooling and ventilation demand of more than 300kW must have a building management and control systems (BMCS) installed by 2025.

Energy audits

19. An **Energy Audit (EA)** is defined as a systematic inspection of energy use and energy consumption of a site, building, system or organisation with the objectives of establishing energy flows, identifying the potential for energy efficiency improvements and reporting them to the energy user. International practice of energy audits distinguishes between simple walk-through energy analysis and in-depth assessment known as Investment-Grade Audit (IGA).
20. Each AKDN Agency shall identify a list of its facilities with energy intensity (kWh/m², or another intensity indicator as determined in para 2.b) above average level for the Agency. The agency must ensure these facilities are **subject to regular energy audit**, carried out by qualified in-house experts and/or third-party accredited experts. The audit must be renewed regularly, each audit taking place a

³ The Energy manager is a person who keeps track of energy use and is responsible for energy reduction at the facility. This is not a full-time role. Often this role is fulfilled by the Facility Manager, if the facility has one.

⁴ Carbon intensity and energy intensity can be assessed per floor area (m²) or another normalising metric suitable to the type of facility, e.g. 'per occupied bed' for hotels or 'per patient' for hospitals.

maximum of five years from the date of the previous energy audit for the building. Energy audits may be stand-alone or be part of a broader environmental audit.

21. The **minimum criteria** that must be fulfilled by obligatory audits have to comply with the following requirements:
 - a) be based on up-to-date, measured, traceable operational data on energy consumption and for electricity - load profiles;
 - b) comprise a detailed review of the energy consumption profile of buildings or groups of buildings;
 - c) be proportionate, and sufficiently representative to permit the drawing of a reliable picture of overall energy performance and the reliable identification of the most significant Energy Conservation Measures (ECMs);
 - d) must contain financial analysis of proposed measures by calculating net present values, cash flows and the resultant discounted savings over time. Simple pay-back approach can be used for simpler facilities. The prices used in the economic analysis shall reflect **the true socio-economic costs and benefits**, including external costs, such as the price of GHG emission reductions. Minimum of 10 USD/tCO₂e shall be used as a benchmark.
 - e) allow detailed and validated calculations for the proposed measures so as to provide clear information on potential savings. The data used in energy audits shall be storable for historical analysis and tracking performance.
22. Agencies may decide to opt for a simpler, walk-through energy audit, which corresponds to Level 1 ASHRAE⁵ standard, or to undertake more in-depth assessment in the form of Investment-Grade Energy Audit (IGA). For buildings with annual energy consumption exceeding 500 MWh or space of over 1,000 m², **IGA-type audit is mandated**. Please refer to Appendix B.1 and B.2 of the Guidelines for template of the Terms of References for Walk-Through and IGA audits.
23. In countries where energy audits are required by local regulations, the level of detail and assessment method will suffice to meet the AKDN energy audit requirement.
24. Facilities with an ISO-certified EMS are exempt from the requirement for energy audit.

Energy retrofits

25. Based on results of Energy Audit, **investment plan for facility's retrofit** shall be elaborated and implemented within 4 years from undertaking energy audit consisting as a minimum of the following Energy Conservation Measures (ECMs):
 - ECMs required to reduce facility's carbon footprint by 25%; and
 - ECMs with aggregated simple payback period of 10 years or less.
26. During replacement cycles, appraisal of equipment shall be based on energy efficiency and energy performance and ratings.
27. The **use of on-site power generators** using fossil fuels in the existing facilities shall be allowed only in the following circumstances:

⁵ ASHRAE stands for American Society of Heating, Refrigerating and Air-Conditioning Engineers

- Use of renewable energy to meet the full demands for facility's power use is not feasible in this location;
 - Grid supply is not sufficient or reliable to maintain facility's essential operations.
28. Operations of coal-based heat or power supply systems should not be allowed in the existing facilities unless alternative energy solutions are not technically feasible in the given locations.
29. Each Agency shall ensure that at least 5% of the total floor area of heated and/or cooled buildings which are owned and occupied by the Agency, is **retrofitted each year to meet the EDGE Zero Carbon Standard** (without offsets). The 5% rate shall be calculated on the total floor area of buildings with a total useful floor area over 250 m² owned and occupied by the concerned Agency.

Appendix A: AKDN Standard Design brief: Environment Section

Overall Performance

- 1) The design shall be assessed with the IFC EDGE tool (<https://edgebuildings.com/>).
- 2) The design shall minimise energy and water use and shall meet at least EDGE Advanced performance.

2a) (**Addition for projects with construction budget >\$5M**): The project shall meet EDGE Zero Carbon standard by using only renewable energy, generated on-site. Where the possibility exists of procuring zero-carbon electricity generated off-site through a “green tariff”, this can also be pursued. No forms of offsets or carbon credits are acceptable).

- 3) Design shall follow the latest AKDN Green Building Guidelines.

Energy Use

- 4) All heating and cooling needs of the building shall be met without the use of fossil fuels. This means that all heating and cooling needs shall be met via passive design, supplemented by high-efficiency HVAC systems, powered by renewable energy generated on-site or off-site. The design decisions to minimise energy use shall be prioritised in the following way:
 - Priority 1: Minimise energy use through passive design.
 - Priority 2: Meet operational requirements, incl. thermal comfort requirements, via efficient plant and equipment, minimising energy demand.
 - Priority 3: Meet the energy demand with renewable energy.
- 5) No generators shall be used to meet the energy needs of the building. A generator may only be included to be used during rarely (<5% of normal operations) as a backup.
- 6) Coal shall not be used on site as the source of energy – heat or electricity.

Water Use

- 7) All water taps and shower heads shall be specified as low-flow solutions, available on the market. Any toilets and urinals shall be low flow or dual flush solutions, available on the market.
- 8) The design shall include a rainwater harvesting system.

Materials

- 9) At least 25% of construction materials (by weight) shall be from the low-carbon materials at the end of this Section (subject to availability and feasibility in the project location).
- 10) The project shall prepare a Design for Deconstruction plan, following the SEDA guideline⁶.

Climate Change Adaptation

- 11) The project shall include a climate risk assessment covering relevant weather-related hazards. Hazards to consider include, where relevant: flooding (surface water, fluvial, coastal, groundwater), drought, slope failure, avalanche risk, as well as any other relevant risks. If a hazard, vulnerability and risk assessment (HVRA) exists for the site, this can be used.

⁶ Design for Deconstruction: SEDA Design Guidelines for Scotland. Available online at <https://static1.squarespace.com/static/5978a800bf629a80c569eef0/t/5aa999f7652deaa430532afd/1530223259684/Design+%26+Detailing+for+Deconstruction.pdf>

- 12) If future climate data is available, this shall be used to assess climate risks over the lifetime of the development. If future climate data is not available, appropriate climate change factors shall be agreed with the client for relevant climate hazards at the start of the project.
- 13) The project shall prepare a climate change adaptation plan, specifying how the building and its systems can be adapted in the future to cope with increased climate risks, such as overheating or higher flood risk.

Reporting and Client Engagement

- 14) The project shall produce an **environmental report**, summarising how the requirements of this section have been met. As a minimum, the environmental report shall have the following components:
 - a. Summary of EDGE assessment, demonstrating EDGE Advanced performance.
 - b. Summary of energy strategy, demonstrating how heating and cooling demands have been met, as well as summary of any on-site energy generation. Summary of outputs from energy model.
 - c. Design for deconstruction statement.
 - d. A summary of the climate risk assessment and how the design has addressed any risks.
 - e. The climate change adaptation plan for the project.
 - f. Summary of water efficiency measures and savings.
 - g. Any other relevant environmental considerations.
- 15) *(If not stipulated elsewhere: A clause to stipulate the mechanism for engagement with client, e.g. quarterly meetings, kick-off sustainability meeting)*
- 16) *(If not stipulated elsewhere: A clause to require cost-benefit analysis to be done on whole-life basis)*

Exceptions and Departures

- 17) Exceptions on any of the clauses above can be accepted only where a client design review concludes that meeting these requirements is not technically feasible.

List of green materials:

- Concrete containing low-carbon cement (<600kg CO₂e per metric tonne of cement)
- Concrete with 25% cement replacement (GGBS, fly ash or other)
- At least 50% recycled content in steel
- Sustainably sourced timber (certified)
- Bamboo
- Compressed earth bricks (not baked). Can be stabilized with cement.
- Rammed earth and other earth-based materials (not baked)
- Recycled polymers
- Any materials directly reused from other projects – e.g. steel elements

Appendix B.1 Terms of Reference: Walk-through Energy Audit

Task 1: Undertake walk-through energy audit

The Consultant will perform walk-through audits in selected AKDN facilities. The walk-through audit procedure and report's format will be agreed and discussed with the Customer before the beginning of the assignment, but is expected to include the following information:

- *Description of the selected facilities:* Report on the location, climate, usage and technical characteristics and conditions of the building structures and systems and identify relevant and applicable legal requirements, environmental and other standards that need to be considered for implementation.
- *Energy baseline:* Building on information collected through the walk-through energy audits the Consultant will establish an energy consumption baseline for the selected buildings. To establish the baseline relevant and available data from invoices and price lists, etc., will have to be collected, including:
 - Monthly amounts of energy consumption for at least **the last 12 months** (electricity, fuels): quantity used, amount of money paid, tariff system
 - Raw water and treated water: quality, quantities, costs;
 - Weather data;
 - Information on electricity, steam or water meters around the site (type, age, last calibration, frequency of their usage, intervals of readings, reporting, etc.).

This data will provide inputs for calculation of energy balances, and determination of specific energy consumption (SEC) of a building in kWh/m².

Task 2: Identify and analyse Energy Conservation Measures (ECMs)

- *Energy Conservation Measures (ECMs):* Present a methodology to analyse and identify different applications of energy efficiency measures per selected building, such as replacement of windows and doors, insulation of walls, floors and roof, replacement of lighting and electric system. Develop a heating/cooling strategy considering the heating/cooling demand after rehabilitation along with proper ventilation considerations. Establish various levels of upgrade for EE and describe the objectives and scope of each level.
- Propose a recommended technical design: Based on results of the analysis described above, recommend solutions for energy efficient measures from a technical and financial perspective per building (or a set of buildings) for various levels of upgrade. This should take into account technology risk, institutional setup, the impact of the local climate, the cost and availability of the technology, and any other relevant factors.
- Expected results: Report the expected costs and energy savings as well as other benefits arising from the suggested energy efficiency measures for the various levels of upgrade.

For each technically-viable ECM the following information shall be provided:

- energy savings: both based on achievement of established norms (heating, lighting, cooling) as well as expected actual energy savings as a share of total energy cost;

- investment costs
- simple payback based on both adjusted and actual savings
- other environmental benefits
- operations and maintenance (O&M) and training requirements
- provisions for energy use monitoring.

Task 3: Presentation of Audit Result

Consult shall present results of the conducted analysis in the Final Report, including an executive summary with the description of main recommendations in the form of the table, in line with the provided template (below).

	Proposed ECM (Title and short description)	Energy Savings	Energy savings	CAPEX	Payback Period
		% of Total Energy Cost	USD	USD	Years

Appendix B.2 Terms of Reference: Investment Grade Audit (IGA)

Task 1: Collect and Review Facility Information and Establish Baseline

Task 1.1: Collect and review facility information

The Consultant/Firm will be required to review the existing operational characteristics of the building, existing documentation and management practice. The review should cover at a minimum the following information for the past **36-month** period:

General Facility Information

- Building list with square meters and age (including age of major remodels or additions)
- Construction data of buildings and major additions including building envelope, window specifications/performance and roof/wall assembly. It should be noted that the available plans should represent the "as-built" rather than the "design" conditions.
- General use of facility

Equipment and Facility Information

- Equipment Descriptions: Descriptions of all major energy and water consuming or energy and water saving equipment
- Facility Descriptions: Description of any structural or building use changes
- Past Changes: Record of any improvements or modifications related to energy, water or operational efficiencies that have been installed during the past three years
- Future Plans: Description of current or future plans regarding building or equipment modifications
- Drawings and Specifications: Drawings, as available (may include mechanical, plumbing, electrical, building automation and temperature controls, structural, architectural, modifications and remodels). Original construction submittals and factory data (specifications, pump curves, etc.), as available

Operations Information

- Occupancy schedules and comfort level
- Usage information
- Description of current energy management procedures
- Description of current operational practices
- Operating engineer logs, maintenance work orders, etc., as available
- Records of maintenance expenditures on energy or water-using equipment, including service contracts

Financial Information

- Utility company invoices

Inventory of Existing Systems and Equipment

Compile an inventory based on a physical inspection of the major electrical and mechanical systems at the Facility, including for each system, the loads, proper sizing, efficiencies or hours of operation:

- Cooling systems and related equipment
- Heating and heat distribution systems
- Automatic temperature control systems and equipment
- Air distribution systems and equipment
- Outdoor ventilation systems and equipment
- Kitchen and associated dining room equipment, if applicable
- Exhaust systems and equipment
- Hot water systems
- Electric motors, transmission and drive systems
- Interior and exterior lighting
- Laundry equipment, if applicable
- Water consumption end uses, such as restroom fixtures, water fountains, irrigation
- Other major energy using systems, if applicable

Task 1.2: Establish Baseline

Estimate Loads

- Estimate loads, usage and/or hours of operation for all major end uses of total facility consumption including: lighting, heating, cooling, motors (fans and pumps), on-site generators, plug loads, kitchen equipment, water, and other major energy and water using equipment.
- Create building model/energy end-use breakdown assessment utilizing local weather data, linear regression analysis and other best practices
- Where loading or usage are highly uncertain (including variable loads such as cooling), Consultant shall use its best judgment, spot measurements or short-term monitoring. It should not be assumed that equipment run hours equal the operating hours of the building(s) or facility staff estimates.

Estimate Baseline Usage

- Examine utility bills for the past 36 months for electricity, gas, fuel, water, etc.
- Establish base year and/or baseline consumption and present base year and/or baseline consumption in terms of energy units (kWh, kW, MJ, or other units used in bills), in terms of dollars, and in terms of dollars per square meter.
- Describe the process used to determine the base year and/or baseline consumption and demand (averaging, selecting most representative contiguous 12 months, normative versus

actual consumption in case energy service level is inadequate and does not ensure minimum comfort and occupancy standards).

- Consult with facility personnel to account for any anomalous schedule or operating conditions on billings or equipment conditions that could skew the base year and/or baseline representation.

Benchmarking

- Calculate Specific Energy Consumption (SEC) for the Facility in kWh/m² and compare it with established norms, standards (local or international) and other appropriate benchmarks for similar types of Facilities/climate to identify potential scope for improvements

Task 2: Identify and Analyse Energy Conservation Measures (ECMs)

Based on undertaken analysis, Consultant shall identify and recommend a series of no/low, medium and investment grade Energy Conservation Measures (ECMs).

Task 2.1: Develop a preliminary list of potential energy and water saving measures.

- List all potential opportunities, whether cost-effective or not.
- Consider technologies in a comprehensive approach including, but not limited to: lighting systems, heating/ventilating/air conditioning equipment and distribution systems, controls systems, building envelope, motors, kitchen equipment, pools, renewable energy systems, other special equipment, irrigation systems, and water saving devices.
- Identify measures which appear likely to be cost effective and therefore warrant detailed analysis
- Assess deep retrofit options and whether the building is “ripe” for deep retrofit: Survey performance and quality of passive energy elements such as envelope performance (window, wall, roof, floor, slab), points of infiltration, daylighting/blinds.

Task 2.2: Analysis for Investment Grade Audit

Savings Analysis

- Provide analysis methodology, supporting calculations and assumptions used to estimate savings.
- Manual calculations should disclose essential data, assumptions, formulas
- For savings estimates using computer simulations, Consultant shall provide access to the program and all inputs and assumptions used, if requested.
- Provide detailed calculations for any rate savings proposals
- Provide detailed supporting calculations for any proposed maintenance savings
- Estimate any environmental costs or benefits of the proposed ECMs (e.g. disposal costs, avoided GHG emissions, water conservation, etc.)

- Specify Facility operations and maintenance procedures which will be affected by the installation/implementation of the proposed ECMs.

Financial Analysis

- Provide detailed estimates of costs associated with the installation, implementation and commissioning of each of the ECM proposed in the Audit with breakdown of labour and equipment cost.
- Undertake assessment of cost saving based on latest tariff information from utilities/energy providers
- Conduct financial analysis for each ECM, including calculation of Net Present Value, economic and financial Internal Rate of Return (IRR) and pay-back period

Measurement and Verification Plan

- Provide a preliminary savings measurement and verification plan for each proposed ECM

Task 3: Presentation of Audit Result

Consult shall present results of the conducted analysis in the Final Report, including an executive summary with the description of main recommendations in the form of the table, in line with the provided template (below).

	Proposed ECM (Title and short description)	Energy Savings	Energy savings	CAPEX	Pay back Period	Economic IRR	Financial IRR
		% of Total Energy Cost	USD	USD	Years	%	%