

The Rapid Assessment Framework

A Practical Tool for Instituting Urban Energy Efficiency



The screenshot shows the 'Energy Efficient Cities Initiative Rapid Assessment Framework' interface. It features three main columns of interactive buttons: 'Energy Benchmarking' (Benchmark Data, Benchmark Results), 'Priority Sectors' (Relative Energy Intensity, Sector Energy Spending, City Authority Control, Sector Prioritization), and 'Energy Efficiency Recommendations' (Recommendations, Initial Appraisal, Energy Savings Assessment, Review). A 'Save' button is in the top right, and a 'Documents' button is at the bottom right. A 'Help and Information' section is at the bottom left.

The Rapid Assessment Framework (RAF) is designed to present a quick, first-cut, sectoral analysis on city energy use. This assessment framework prioritizes sectors with significant energy savings potential, and identifies appropriate energy efficiency interventions. The RAF covers energy efficiency across six sectors—transport, buildings, water and waste water, public lighting, solid waste, and power and heat. It is a simple, low-cost, user-friendly, and practical tool that can be applied in any socioeconomic setting.

The RAF consists of two principal components: (i) a city energy benchmarking tool and, (ii) a 'playbook' of tried and tested energy efficiency interventions. These two components are woven into a user friendly software application that takes the user through a series of sequential steps: from initial data gathering to a report containing a matrix of energy efficiency recommendations tailored to the city's individual context, with implementation and financing options. The steps are as follows:

① Collation of Candidate RAF City Energy Use Data

The RAF contains a database of 26 key performance indicators (KPIs). Each of the data points that make up these KPIs, as well as a range of city specific contextual information, is collected prior to the application of the RAF. Below is a list of KPIs organized by sector:

CITY WIDE KPIs		POWER & HEAT KPIs	
SW-1	Electricity consumption (kWh/capita)	PH-1	Percent of households with authorized electrical services
SW-2	Electricity consumption (kWh/GDP)	PH-2	T&D losses as % of total electric consumption
SW-3	Primary energy consumption (MJ/capita)	PH-3	Nontechnical T&D losses as % of total electric consumption
SW-4	Primary energy consumption (MJ/GDP)		
TRANSPORTATION KPIs		WATER & WASTEWATER KPIs	
T-1	Total transport MJ/capita	WW-1	Water consumption L/capita/day
T-2	Public transport MJ/passenger km	WW-2	Energy density of potable water production (kWh/m ²)
T-3	Private transport MJ/passenger km	WW-3	Energy density of wastewater treatment (kWh/m ³)
T-4	Transportation mode split (%)	WW-4	Percentage of nonrevenue water
T-5	Meters of high capacity transit per 1,000 people	WW-5	Electricity cost for water treatment (potable and wastewater) as a percentage of the total water utility expenditures
BUILDINGS KPIs		WASTE KPIs	
B-1	Municipal buildings (kWh/m ²)	W-1	Waste per capita (kg/capita)
B-2	Municipal buildings energy spend a percent of muni budget	W-2	Capture rate of solid waste
		W-3	% of solid waste recycled
		W-4	% of solid waste that goes to landfill
		W-5	% of solid waste that goes to capped landfills
STREET LIGHTING KPIs			
SL-1	Electricity consumed per km of lit roads (kWh/km)		
SL-2	% of city roads lit		

KPIs have been collected from a number of sources including the World Resources Institute, the UN-Habitat Urban Indicators and the Little Green Data Book to populate a city database. One of the ultimate goals of the RAF is to facilitate the establishment of a comprehensive database of city data, and as the RAF is rolled out, this collection of information will grow with current and reliable data. Field testing in Quezon City, Philippines indicated that it is most important to focus on identifying a minimum number of data points for each KPI, i.e. each city will not have values for each KPI, but each KPI will have a minimum number of cities with data.

② Analysis of City Energy Use Against a Range of Peer Cities

Prior to the city review, city data is incorporated into a benchmarking tool containing KPI data from 56 cities of varying population, climate and wealth. The performance of a city's RAF is compared with a range of peer cities, selectable by the city, to determine their performance in each of the six sectors (2-5 KPIs per sector). The benchmarking process provides an overview of energy performance in the RAF city across all sectors. For example, a city could have good performance in one area and yet need improvement in another.



③ Assessment and Ranking of Individual Sectors

During city review, a number of meetings and interviews are conducted, and additional data is collected across city departments and agencies, to augment benchmarking results. At the end of the first phase of the review, a formal prioritization process takes place in order to identify sectors with the greatest technical energy savings potential. Energy costs are also weighed based on the ability of city authorities to control or influence the outcome. In the end two or three sectors are reviewed in detail in the second phase of the commission. In Quezon City, the transportation, public lighting, and buildings sectors were chosen based on their potential energy efficiency improvement, percentage energy use, and the city's level of control.

④ Investigation of Individual Energy Efficiency Recommendations

The RAF contains a playbook of over 60 practical and effective energy efficiency recommendations in each of the sectors. Some examples include:

- Organizational Management: Energy Efficiency Task Force, Energy Efficient Procurement
- Transport: Traffic Restraint in Congested Urban Areas, City Bus Fleet Maintenance
- Waste: Waste Management Hauling Efficiency Program
- Water and Wastewater: Pump Replacement Program
- Power & Heat: Solar Hot Water Program on Buildings
- Public Lighting: LED Replacement Program for Traffic Lights
- Buildings: Lighting Retrofit Program

Recommendations in each priority sector are quantitatively and qualitatively evaluated based on key data including institutional requirements, energy savings potential and co-benefits. Energy savings potential is calculated where possible to provide an estimate of the benefit of each intervention. At this stage some recommendations will be carried forward and these will be supported by implementation options, case studies and references to tools and best practices. Field testing in Quezon City showed that a quantitative approach to recommendation selection is essential to identifying recommendations with the best potential and that contextual analysis is essential to ensure that recommendations are appropriate for a specific location.

⑤ Report Submission of Recommendations and Possible Implementation Strategies

Finally, after completion of the city review, a Final City Report is produced that records the process undertaken during the city review. Along with city background information and various records of the city mission included in introductory sections and addendum, this report also provides:

- a summary of the benchmarking results along with analysis of city performance and implications,
- background information to and summary of sector prioritization on the city government and city-wide scales, and,
- a draft strategy for implementing recommendations, provided in summary form as the City Action Plan and in more comprehensive form as recommendations sheets.

The key purpose of the Final City Report is to enable the city to take forward recommendations in a structured and logical manner to maximize energy savings in a way that makes sense given the city's context, structure, and resources.

The Energy Sector Management Assistance Program (ESMAP) is a global knowledge and technical assistance program administered by the World Bank and assists low- and middle-income countries to acquire know-how and increase institutional capability to secure clean, reliable, and affordable energy services for sustainable economic development.

For more information about ESMAP, please visit us at www.esmap.org or write to us at:



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