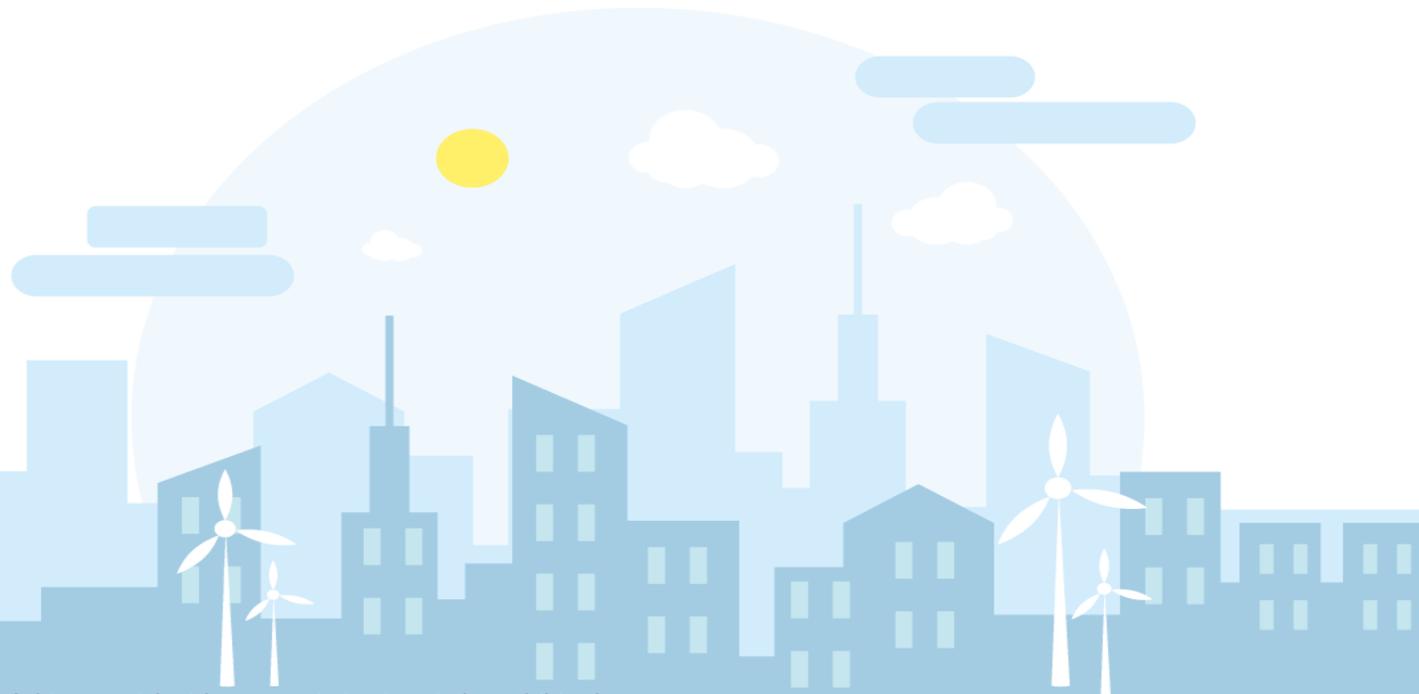


Accessing Funding for Lighting and HVAC Retrofits Projects

Ark Energy | Energy Efficiency Advisory Services

14 July 2021

Version 1



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Agenda

- 1 Energy Efficiency Perspective
- 2 Funding Models
- 3 Project Development Approach
- 4 About Ark Energy



Energy, Water, and Utilities expert with 23 years of North American and GCC experience in management and project development consulting, new business setup, and strategic program design and PMO implementation within conventional and renewable energy, Demand Side Management and Energy Efficiency sectors. At Ark Energy, Aref is focused on Energy Transition program design and implementation PMO, Energy Efficiency and distributed Solar projects development and financing, Energy Efficiency policy design, and digitalization of energy management information systems (EMIS). He heads Ark's business in globally, focusing on GCC and Africa.

HIGHLIGHTS



Founder and Executive Director of TAQATI, the dedicated Program Management Office mandated by Dubai Supreme Council of Energy to implement the Demand Side Management Strategy of Dubai and attain its energy efficiency targets (Dubai, UAE)



Principal at Ernst and Young - Power and Utilities Advisory Services (Dubai, UAE)



Head of Infrastructure and Utilities at General Secretariat of the Executive Council (Abu Dhabi, UAE)



Global Market Program Leader of Alternative Energy at General Electric - Power and Water (NY, USA)



Key executive management and senior advisory roles within the public and private sectors at General Electric (Power and Water), A.T Kearney, ITT (Water and Wastewater)

EDUCATION

Masters in Business Administration
University of Texas

Post-MBA, McGill Canada

Bachelor of Engineering
American University of Beirut (AUB)

LANGUAGES *(Spoken & Written)*

English (fluent), Arabic (native) and French (advanced)

RELEVANT PROJECTS							
Project	Dubai DSM Strategy 2030	DCPs (1, 3, 4, 5, 6 and 11)	Index Tower Al Seef Tower	EREIT building portfolio in Dubai	Sheraton Jumeirah Beach Hotel	Al Ain Mall, Abou Dhabi	Sol Star Building
Typical Project Role	Project Partner: Identify, qualify and create project opportunities, support clients to get the buy-in for, develop, fund and execute building retrofits, delta-t rehabilitation and solar projects, manage the relationship with the C-level client with project oversight, QA/QC and complex technical, commercial and legal consulting						

Section 1

Energy Efficiency Perspective



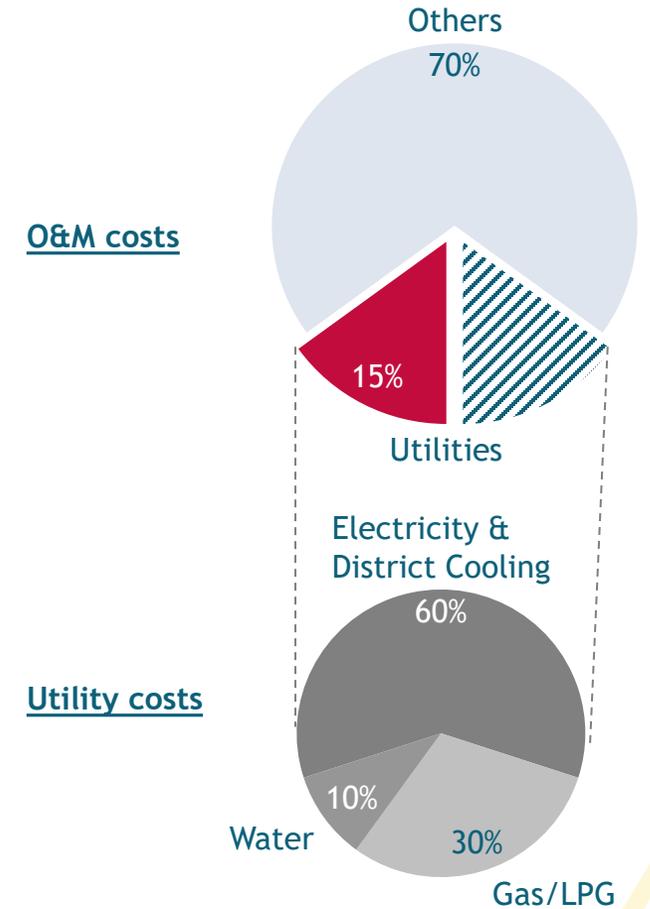
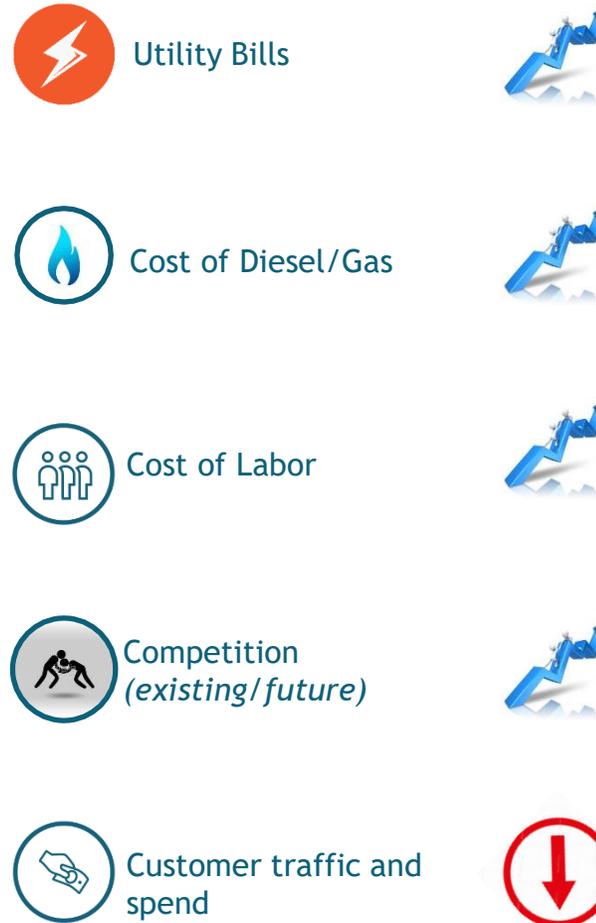
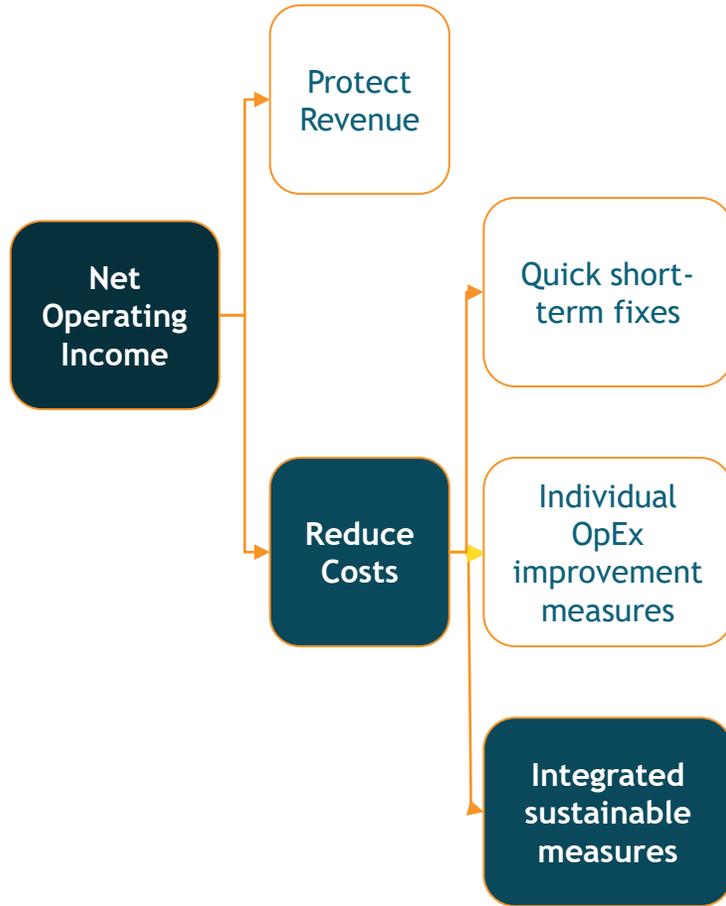
Net Operating Income as a strategic priority

While there is focus on decarbonization, Net Operating Income remains to be a critical KPI and is under tremendous pressure with rising O&M costs and decreasing revenue

To preserve its Net Operating Income, businesses must cut costs or increase revenue

... but these metrics are under tremendous pressure with rising labor and O&M costs, reducing traffic and increasing competition

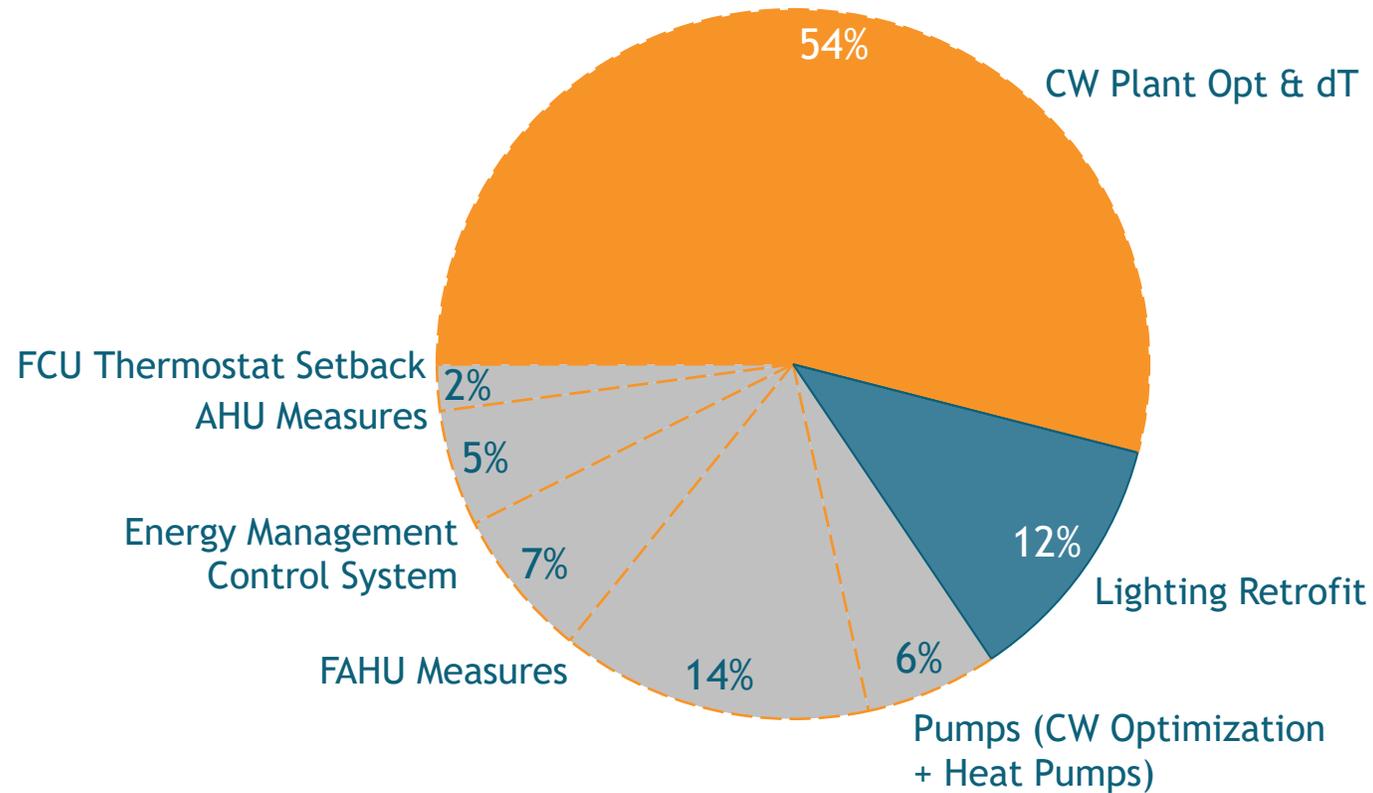
Utilities constitute 15 - 30% of total O&M costs in most businesses and are hence a primary target for cost-cutting initiatives



Energy End-Use Analysis

Cooling and Lighting contribute 66% of energy end-uses in a typical commercial building (hot and humid climates)

Typical Energy Load Split (Commercial Building)⁽¹⁾



(1) Source: Ark Energy team analysis based on Dubai Energy Efficiency Strategy (2019). Number may change based on the energy mix

Energy Transition: Energy Efficiency

Energy Efficiency Retrofit cuts down utility costs, enhances asset lifecycle, improves standards of comfort and reduces your carbon footprint with a 2 to 3-year average payback time

Lowers utility costs and enhances equipment lifecycle with sustainable and integrated energy conservation measures



20 - 50%
Lower Utility Bill

Translates to
3 to 6%
net benefit on P&L

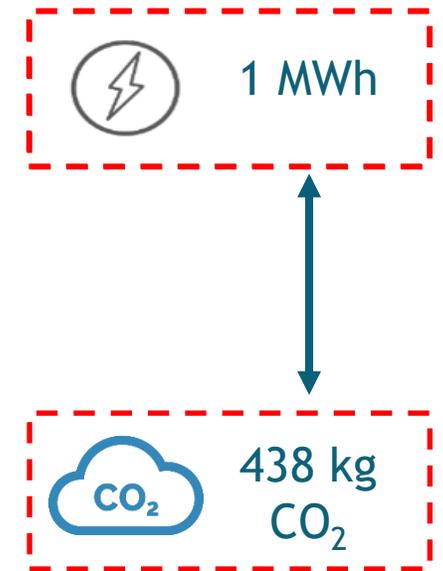
... and improves standards of comfort across different key areas of the building

... and decarbonizes your operations

Focus of the document

	Efficient and Smart Lighting	
	Upgrade of HVAC Systems and Reduction of Cooling Load Requirements	
	Power Quality and Harmonics Improvement, and Enhanced Equipment Lifecycle	
	Upgrade of Building Envelope	
	Digitalization of Energy Operations and Building Automation Systems	arkEMIS
	Efficient Indoor and Outdoor Water Systems	
	Delta-T Rehabilitation	

	Humidity
	Temperature
	Air Flow
	Indoor Air Quality (lower particulates of formaldehyde and CO ₂)
	Light efficacy



What is slowing down the adoption rate for Energy Efficiency projects?

Based on a 2018 study, we have identified challenges such as resource bandwidth, industry know-how, funding, and stakeholder buy-in

Corporate Challenges

(market survey of 1900 respondents)

Focus of the document

72%

Lack of available capital to spend on non-core projects due to depleted cash reserves or lack of access to investors/financiers

60%

Lack of relevant technical or legal knowledge or capability within the client's procurement, contracts, engineering or maintenance team

52%

Constrained resource bandwidth or capacity, and **lack of focused** project ownership

38%

Low client awareness, and confidence in energy efficiency and optimization projects

Project-related Challenges

Stakeholders

- Internal stakeholders' buy-in (Ops, legal, finance, proc)
- Project ownership
- Source of funding

Legal

- Performance contracting model: Shared or Guaranteed
- Safe-guarding Client's investment
- Duration, terms and standards of comfort
- Roles & responsibilities of ESCO vs. Client's O&M team

Commercial

- Business case assessment
- Share split between ESCO and Client
- Measures to reduce cost of financing and project risk
- Future assumptions and forecast energy savings
- Exit (termination) terms
- Performance assurance and savings guarantees

Technical

- ESCO selection
- Technical feasibility assessment
- Site-relevant specifications and applicable standards
- Detailed engineering and design optimization
- Construction supervision and functional tests
- Pre commissioning and commissioning tests

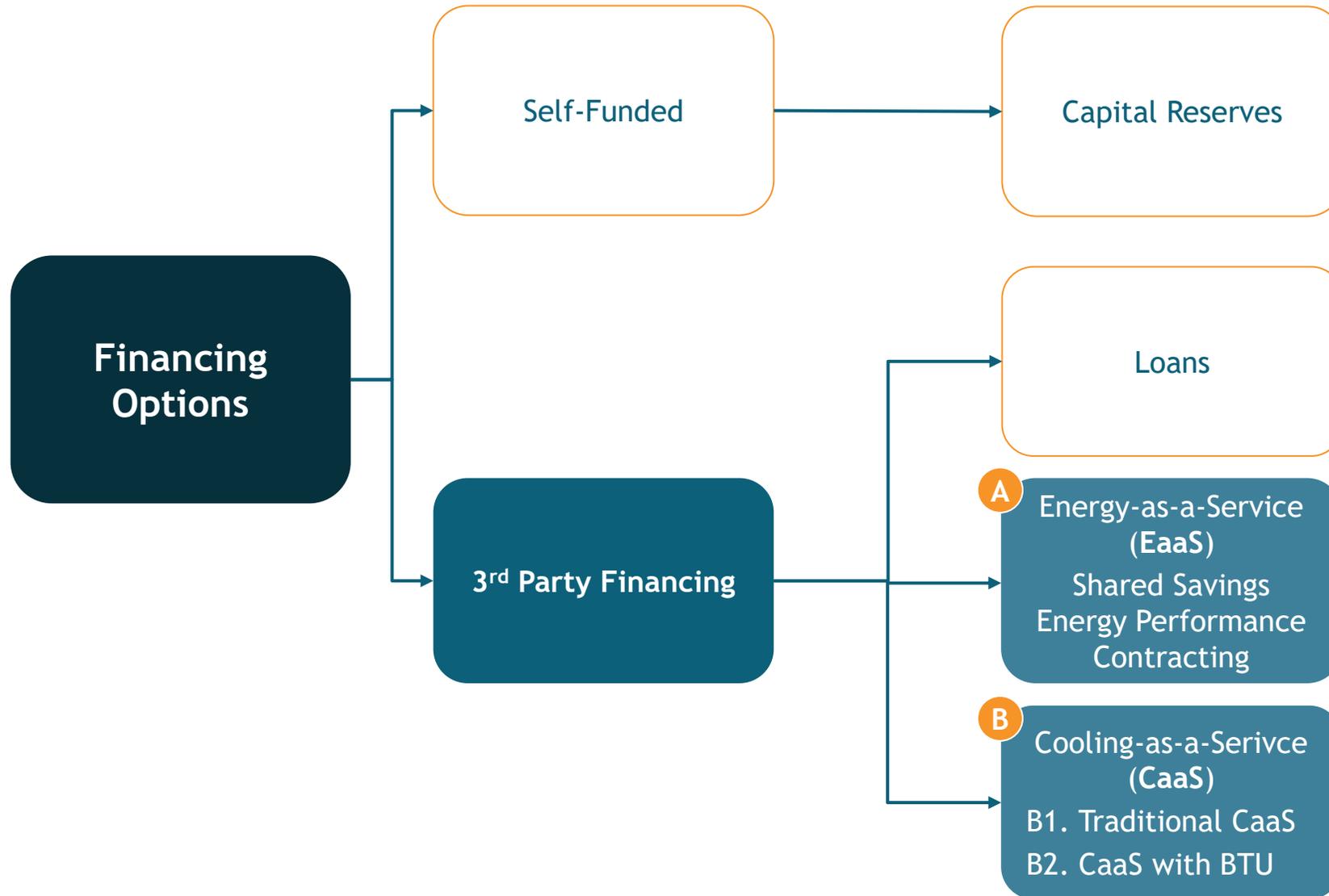
Section 2

Funding Models



Funding Options

Capital allocation and risk appetite drive decision-making to select the most suitable funding mechanism



Highlights

- Working capital depletion
- NPV and IRR driven selection process
- Board decision

- Bonds
- Collateral
- Corporate guarantees
- On Balance sheet

- 3rd party investor
- Off Balance sheet
- OpEx, not CapEx
- Savings guarantee

- 3rd party investor
- Payments are agreed upon as a function of actual usage
- OpEx, not CapEx

A EaaS with Energy Savings Performance Contracting (ESPC) Models

Funding mechanism selection then drives the energy savings performance contracting model

Co-Investment as a HYBRID model

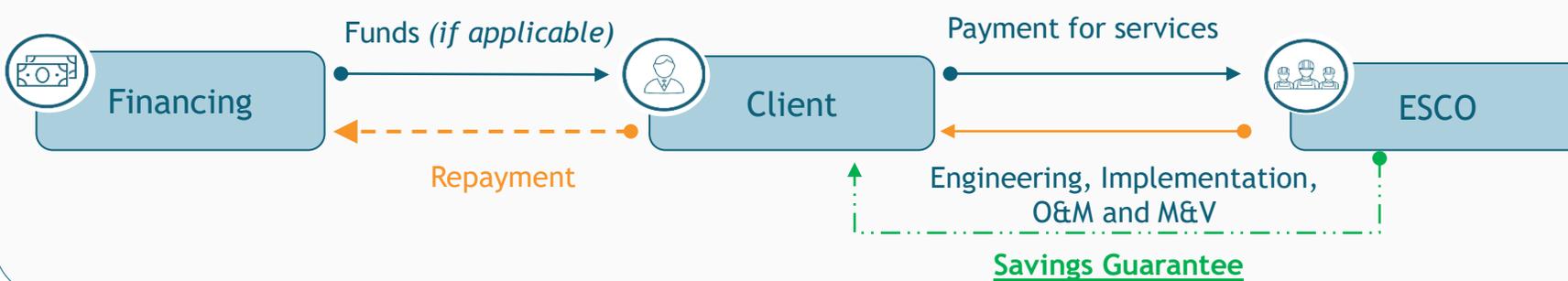
1. Shared Savings ESPC Model



Highlights

- Investor puts 100% of CapEx or Co-Invests
- Savings are shared
- Investment paid back based on performance
- Aligned-interest partnership
- Off the books
- Long-term agreement (5 to 8 years)

2. Guaranteed Savings ESPC Model



Highlights

- 100% Investment sourced by Client
- Savings are 100% to client
- Savings are guaranteed by the ESCO (with contractual limitations)
- Agreement is at the client's discretion

3. Non-ESPC Model (e.g., Design-Build-Operate)

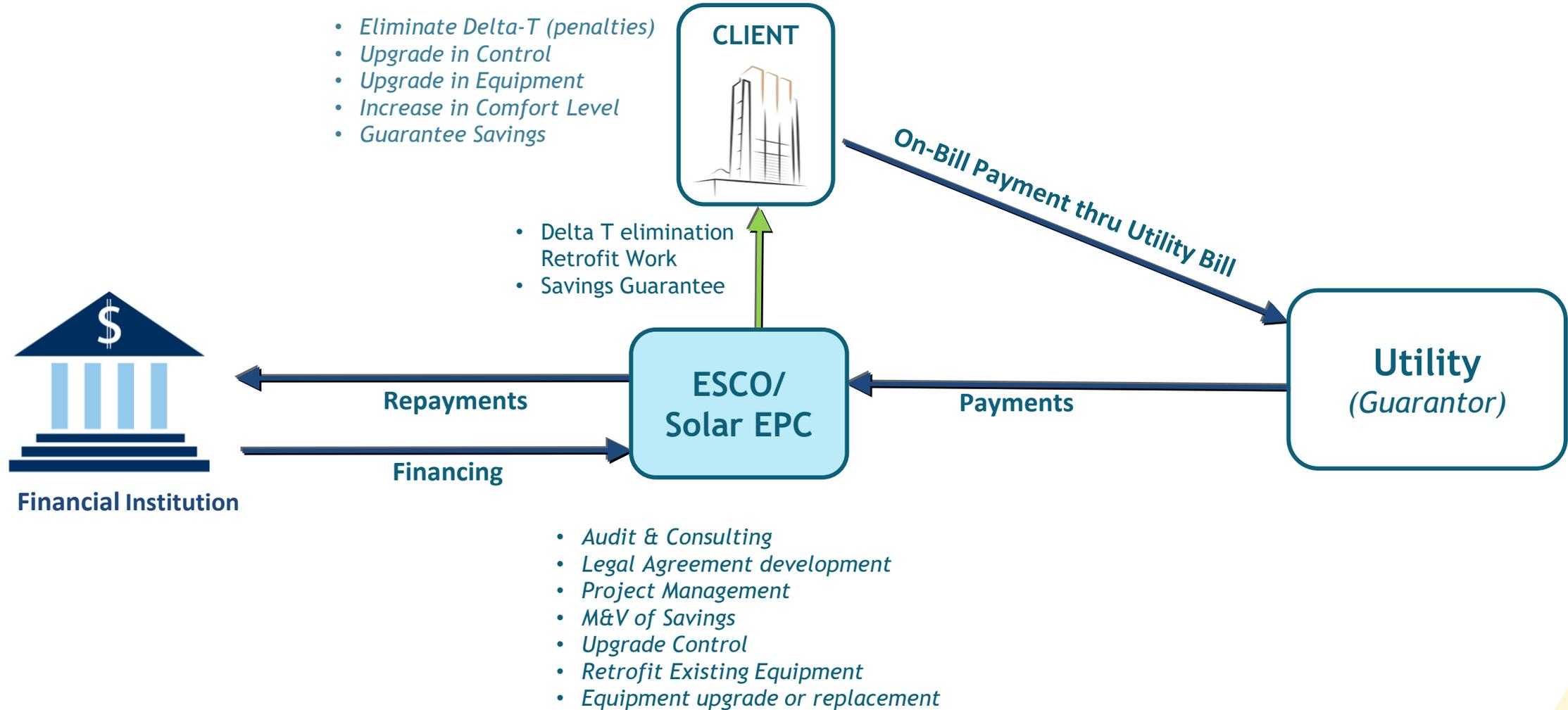


Highlights

- 100% Investment by Client (or thru loan)
- Savings are 100% to client
- Not savings guarantee
- ESCO may stay for operational period

A1 Financing with On-Bill Payment Business Model

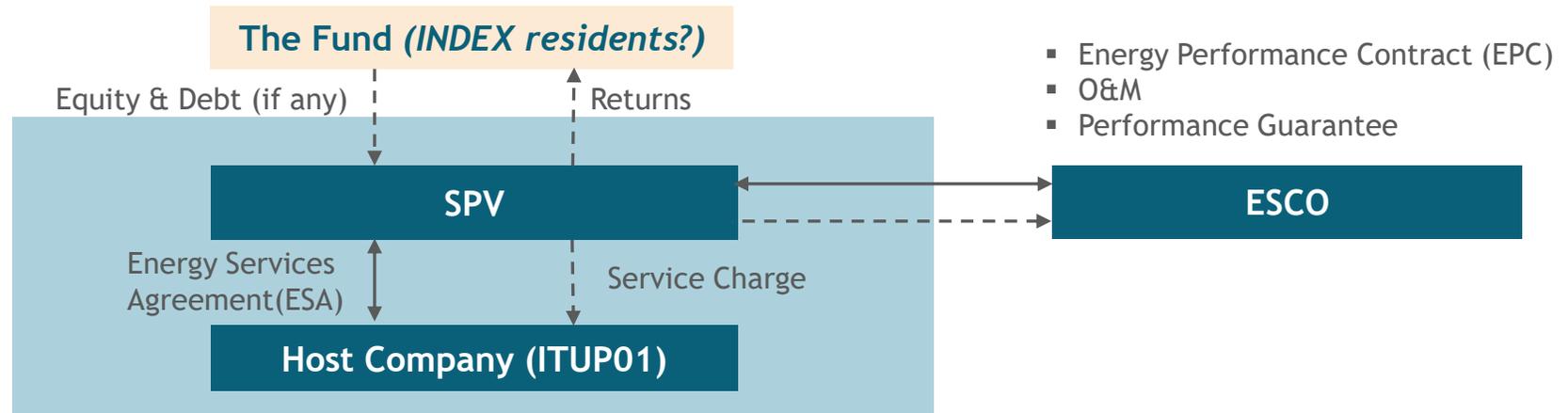
A funding mechanism with On-Bill payment can significantly reduce cash flow risk for the investor, and increase adoption by eliminating financial roadblocks for end-user



A1 Crowd Funding for Energy Performance Contracting

Crowd funding can be an effective tool to deploy in buildings, where the residents can participate in a fund that can invest in a Shared Savings Energy Performance Contract

Simplified contracting structure

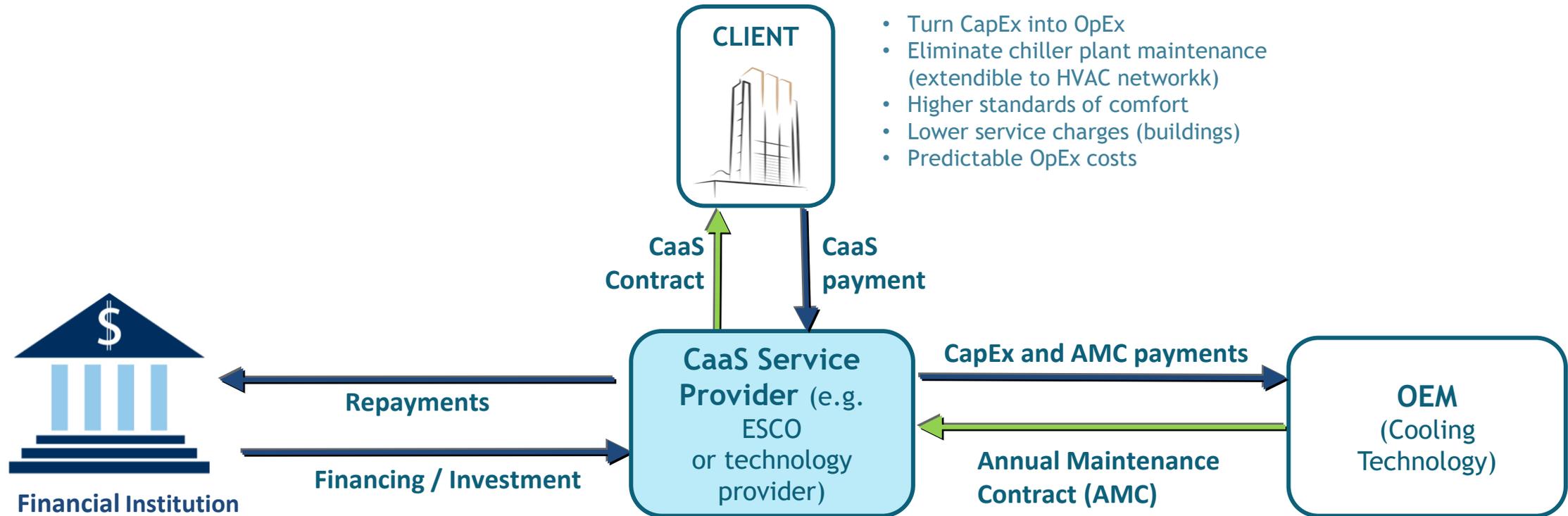


Overview of an energy/cooling services agreement

- 1 The Host enters into an energy services agreement (ESA) with the Special Purpose Vehicle (SPV) - which funds and implements the energy efficiency project - in return for a service charge
- 2 The SPV sub-contracts implementation to an energy service company (ESCO) through an energy performance contract (EPC), financed by The Fund
- 3 The EPC typically incorporates a Performance Guarantee and ongoing Operations & Maintenance (O&M) services. Other EPC terms are designed back-to-back with the ESA, leaving the SPV with the obligation to fund the project and the ESCO the obligation to deliver the project
- 4 The Host has the right to terminate the ESA at any time after implementation for the present value of the future cash flow streams (termination value)
- 5 Ark Energy anticipates that such projects would qualify for off balance sheet treatment (for the Host)

B1 Cooling-as-a-Service (CaaS) - Traditional

In the traditional CaaS model, Client turns CapEx into OpEx with predictable costs, while off-loading all service obligations onto the Service Provider

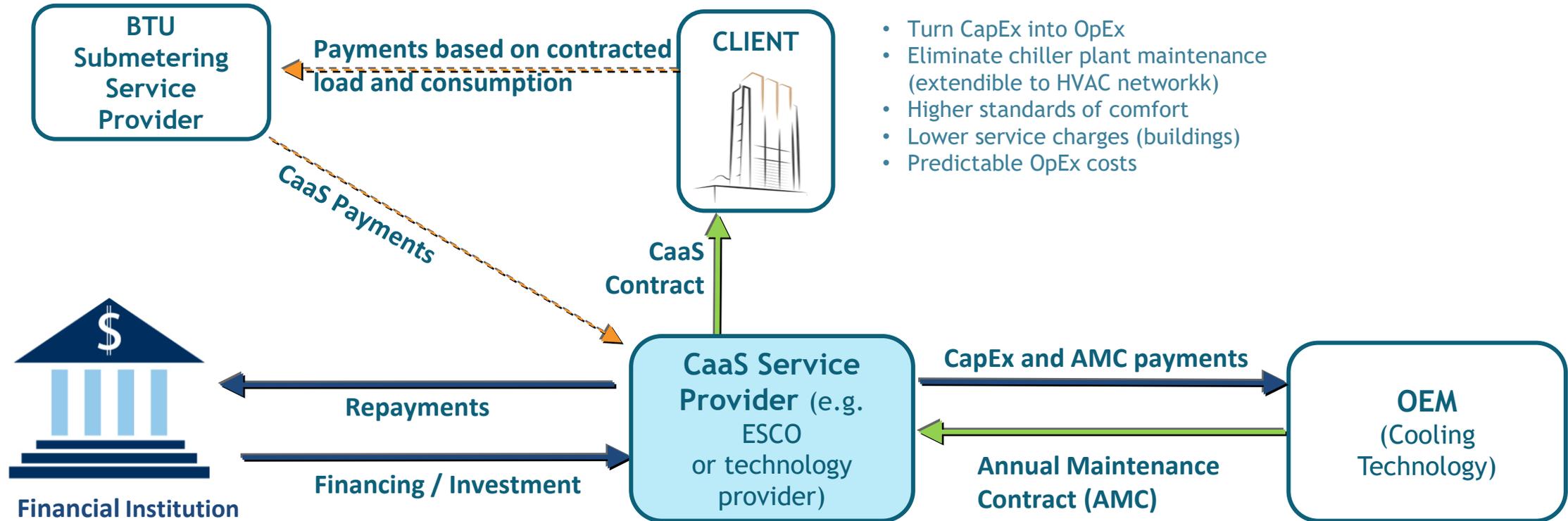


- Turn CapEx into OpEx
- Eliminate chiller plant maintenance (extendible to HVAC networkk)
- Higher standards of comfort
- Lower service charges (buildings)
- Predictable OpEx costs

- Take over aging cooling equipment from the client
- Provide optimum maintenance through their service contracts (AMC) with OEM
- Install metering infrastructure to measure electricity consumption on the chiller plant

B2 Cooling-as-a-Service (CaaS) - BTU Submetering

With BTU Submetering model integrated with CaaS, Client off-loads CaaS payments onto the BTU SSP, and chiller plant / HVAC network upkeep onto the CaaS service provider



- Turn CapEx into OpEx
- Eliminate chiller plant maintenance (extendible to HVAC network)
- Higher standards of comfort
- Lower service charges (buildings)
- Predictable OpEx costs

- Take over aging cooling equipment from the client
- Provide optimum maintenance through their service contracts (AMC) with OEM
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Case Study 1: Industrial Application in Dubai of SSEPC

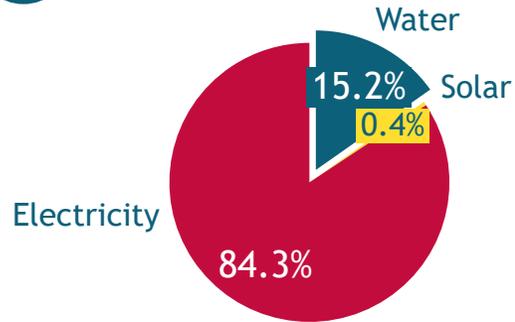
Energy Efficiency Retrofit including chiller swap, SCADA implementation, and O&M digitalization scope fully funded by an investor under an 8-year Shared Savings Energy Performance Contract

Project Background

District Cooling Plant
(Dubai, UAE)

Total Cooling Capacity:
5,450 Tons (TR)

Energy Costs (pre-retrofit, 2020)



Total Utility Costs:
US\$ 1.46 mil

Client Challenges

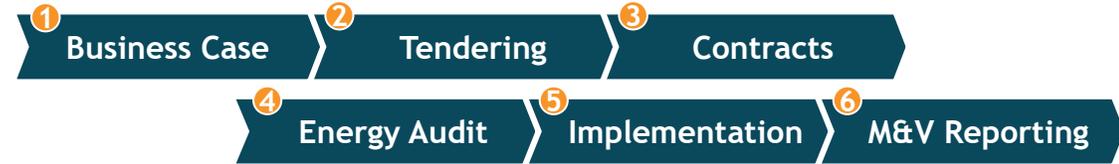
Plant process equipment continuously running on manual mode with no digital energy monitoring or automated fault detection

Equipment and instrumentation in bad conditions with high harmonic issues

Energy costs much higher than benchmarked peers

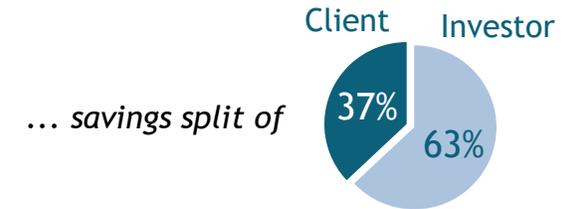
O&M costs increasing constantly

High-level Approach



Project Financing

8-year
Shared Savings Energy
Performance Contract



Project Outcome

US\$ 337k
Annual Savings

21% reduction
in Energy Consumption

4.0 years
Project payback time

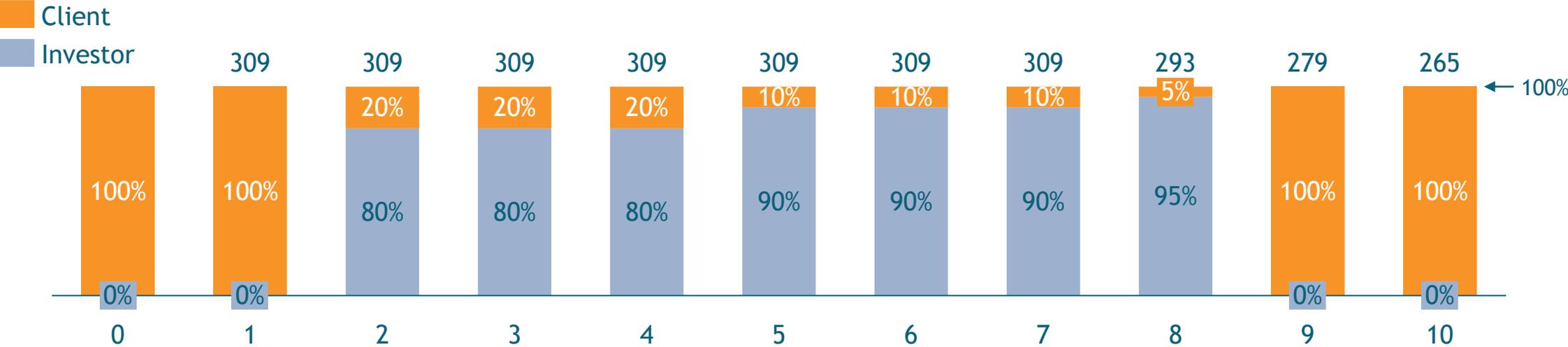
1,158 Tons/yr.
Avoided CO₂ emissions

Digitalization of energy management
(arkEMIS) with AI-enabled asset management

New downstream chiller with a new cooling tower

10-year profit of US\$ 1.14 mil from savings, along with equipment enhancement and operational modernization, and repayment through sharing the savings that significantly de-risk the project

EMICOOL Gross Energy Cost Savings
(2021-2031 estimated, Shared Savings, '000s of USD)



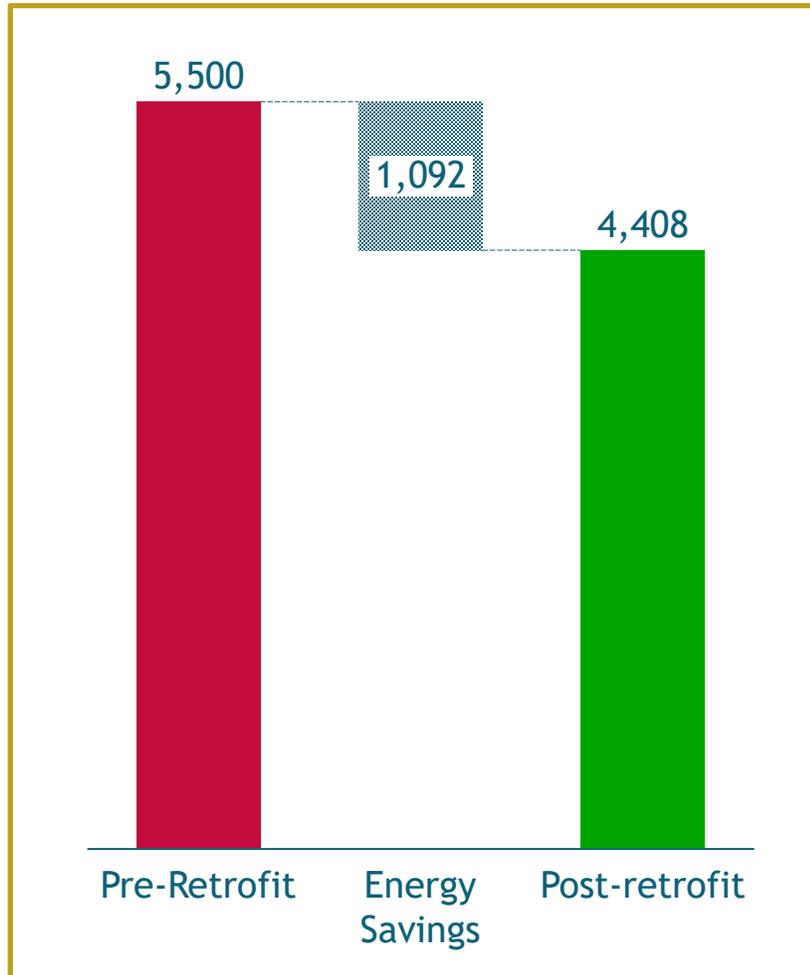
EMICOOL Net Cashflow
(2021-2031 estimated, Shared Savings, '000s of AED)



Case Study 2: Iconic Multi-Use (Commercial and Residential) Building in Dubai

Energy Efficiency Retrofit with lighting retrofit, delta-T rehabilitation, and O&M digitalization scope fully funded by an investor under a 7-year Shared Savings Energy Performance Contract

Annual Utility Cost Savings⁽¹⁾
(‘000s USD)



Summary Project Outcome

Savings	28% (US\$ 1.1Mil) Annual Reduction in energy (kWh) consumption versus baseline	Project Payback Time 2.5 years
CapEx	US\$ 2.75 Mil Initial Capital Investment	

Energy Efficiency Measures

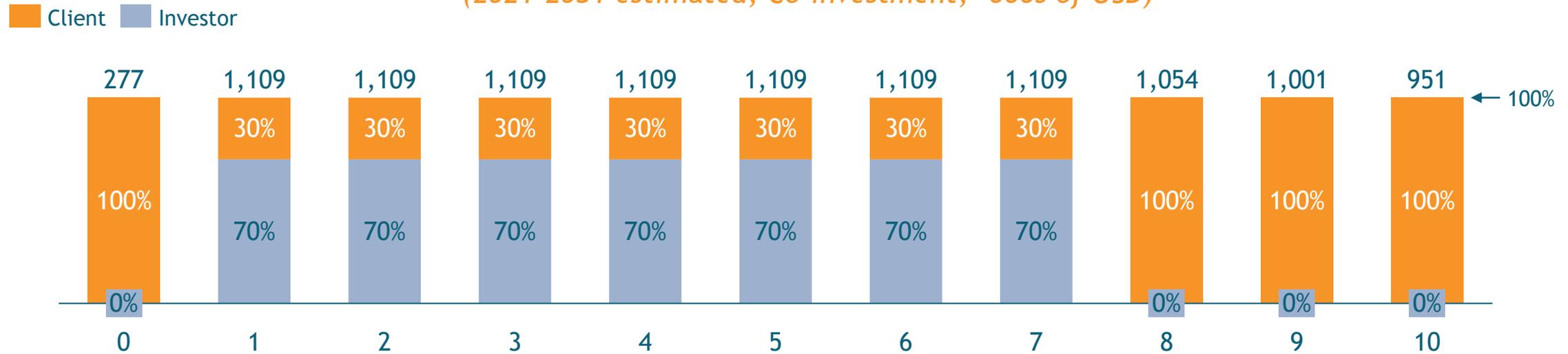
Chilled Water Plant Optimization
Efficient lighting / lighting controls
Pool Hot Water Heat Pump
FAHU Demand Controlled Ventilation and FCU Thermostat Setback
FAHU Supply Air Temperature Reset
Common Area Temperature Management
AHU Supply Fan Static Pressure and Air Temperature Reset
BMS and Controls Upgrade
Energy Control Management System

(1) Does not include any Equipment or Asset O&M costs or resulting savings from the Building Retrofit project

Source: Financed Shared Savings Energy & Delta-T proposal (Nov 2017)

Relatively higher savings split between the investor and Client given the faster payback of the project, with the Client clearing up a net profit of US\$ 5.6 mil over 10 years

Client Gross Energy Cost Savings
(2021-2031 estimated, Co-Investment, '000s of USD)



Client Net Cashflow
(2021-2031 estimated, Co-Investment, '000s of USD)



Section 3

Project Development Approach



Energy Efficiency (Building Retrofits) Project Development Approach

Following a comprehensive approach can help reduce building retrofit project costs, maximize energy reduction, and address every critical issue the asset has

High-Level Approach



Target Setting

The results of the Walk-Thru Audit and Delta-T Assessment can determine the energy savings target that will be requested from the market upon launching the retrofit and Delta-T rehabilitation project

Decision Making drivers

Two prevailing questions were captured from our discussion with Client

1. ***Can the Client verify the savings before we proceed with the project?***
2. ***Which funding model should we undertake: self-fund, 3rd-party fund or hybrid, and when can the Client take a decision on funding model?***

Funding Model Selection for Energy Efficiency (Retrofit) Projects

Carrying out a comprehensive due diligence on the ESCO/Investor's funding proposals is critical to select a funding option that fits the organization's risk appetite and cash position

Selecting the right funding model has always been a major challenge since different vendors propose different solutions and under different terms (tenure, payment terms, savings, conservation measures etc.). We have developed and perfected our cashflow models that integrate all the financial proposal data from all vendors to ensure that we level the playfield and compare likes for likes, alleviating interpretation risks and turning the exercise of selecting the right funding model into a purely quantitative one

Financial Submissions We Request

Multiple Energy Performance Savings Contract models

Tenure of each ESPC contract model proposed

Proposed Energy Conservation Measures along with their forecasted savings and CapEx, and payback time

ESPC models outcome summary

Cost breakdown details of ESPC models

Total project value

Maintenance activities and costs

O&M savings per ECM

Proposed cashflow per ESPC model

Financial KPIs We Investigate

Total forecasted annual savings

Customer share of annual savings

Total customer profit

Customer initial investment (CapEx)

Customer operational costs (Opex)

Total project value

Net present value (NPV)

Return on Investment (ROI)

Internal rate of return (IRR)

Project payback time

Savings degradation after reporting period

Prevailing Questions We Answer (non-exhaustive)

What is the best funding option and what are the payment guarantees that can reduce financing cost?

What is the breakdown of proposed solution pricing, fees, and other costs (normally not provided by ESCO in shared savings contract)?

Are there permissible circumstances to extend contract term, or is the customer's cost share sufficient to preclude any need for modification?

How do we define and operationalize the achievement of contracted savings, e.g., are determinations and payments made monthly, quarterly, or yearly?

What happens if savings fall short of threshold for some periods, but are offset by savings in later periods? When does reconciliation occur?

How much time does ESCO have to remedy shortfalls in savings, if encountered, before non-payment is determined to be permanent for a given year, or an event of default is triggered?

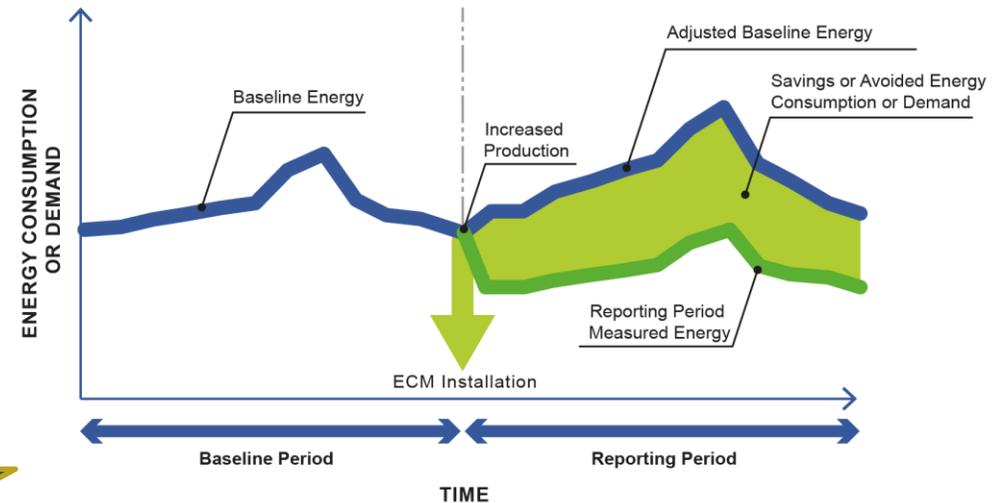
3rd-party Measurement & Verification Audit of Savings

In order to safe-guard the outcome, 3rd party M&V audit of energy savings is critical for the term of the energy savings performance contract, preferably using digital EMIS

Awarded ESCOs are required by contract to report energy savings as per an M&V Plan that Ark Energy assesses and approves. While the M&V plan will rely on IPMVP as the global protocol for measurement and verification of energy savings, auditing energy savings reporting is an essential business requirement, especially in the case of contractual obligations such as savings incentives

Key Drivers for M&V Reporting Period Issues

- **Lack of technical knowledge** of the M&V formulas and regression modeling methodology used to create them
- **Lack of ownership** of the M&V reports
- Lack of experience in assessing the **adjusted baseline** (*core of the IPMVP protocol*), static factors, routine or non-routine adjustments
- Lack of capability to **identify discrepancies** or engage the ESCO in a rational dispute on energy savings
- (at times) Lack of proper M&V reporting (incomplete dashboard)



Disputes may arise during the reporting period that can result in litigations and disruption of Energy Management Services

Mitigating Risks during the M&V Plan Development phase

- **Select the right M&V Option** depending on the retrofit plan
- **Utilize our proprietary M&V model** to develop adjusted baseline regressions
- **Identify and validate independent variables** to minimize model uncertainty
- Capture independent variables datasets from **trusted market sources**
- **Back-test** the M&V model using historical data
- Assess static factors and quantify their impact

Mitigating Risks during M&V Reporting Period

- Monthly Energy Savings report evaluation
- Quarterly Energy Savings Audit
- Annual Energy Savings Audit
- **Digitalized Measurement and Verification of savings** with automated reporting (**arkEMIS**)

Section 4

About Ark Energy



Facilitating Energy Transition

Ark Energy is a specialized boutique advisory firm that consults private and public sector clients to transition into low-carbon, smart and efficient energy systems through 7 niche services

Energy Transition Services

1 Energy Transition Strategy Design and PMO

Design and implement executable **Energy Transition strategies** including **Demand Side Management (DSM)** and **Renewable Energy Strategy (RESF)** with savings targets (net zero) and implementation roadmap, **Program Management Office** setup and implementation, and monitoring and evaluation of programs based on up-to-date technologies, standards and best practices. **Challenge existing energy services business models**, develop and roll-out **new energy services business units**, and re-design their **customer experience / customer journey** with UXUI integration

3 Digitalization of Energy Management, and Measurement and Verification of Savings

Integrate our state-of-the-art, easy-to-access, cloud-based **digital Energy Management Information System platform (arkEMIS)** to provide **AI-enabled energy data analytics**, visualization, automated reporting, drifting and fault detection

2 Energy Efficiency (Building Retrofit) Project Development Consulting and Execution Management

Take the headache away from our clients and provide them with **turn-key advisory & project development services as Owner's Consultant using proprietary methodology suite of tools** (technical, commercial, legal and project management) to execute and fund their Energy Retrofit projects

4 Solar Project Development Consulting and Execution Management

Take the headache away from our clients and provide them with **turn-key advisory & project development services as Owner's Consultant using proprietary methodology suite of tools** (technical, commercial, legal and project management) to execute and fund distributed Solar projects

5 Delta-T Rehabilitation Assessment and Execution Management

Carry out highly specialized assessment to analyze **root causes behind Low Delta-T syndrome**, provide and validate a rehabilitation roadmap, source funding, and manage its execution

6 Thermal Cooling Load Assessment

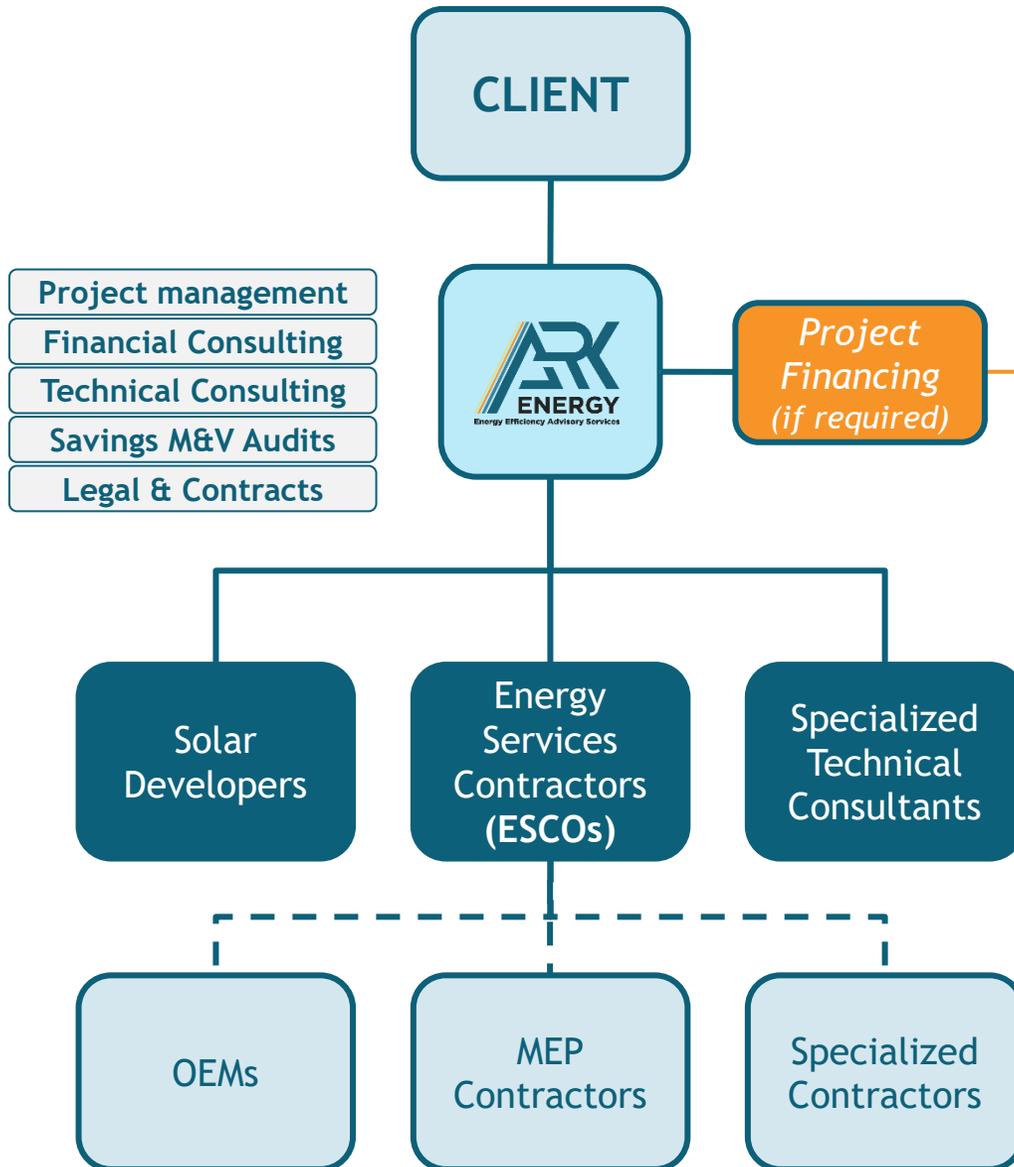
Conduct cooling load assessment using exhaustive and calibrated energy modeling (IES VES) and Building Information Modeling (BIM) to **accurately estimate declared load from DC operators** or chiller plant, and cooling energy distribution

7 Building Recommissioning and BTU Submetering

Carry out building recommissioning or retro-commissioning for existing building stock
Project manage BTU submetering infrastructure funding and roll-out

Project Development Consulting Business Model

We have developed a unique overarching business model dedicated to take away the headache from our clients throughout the project lifecycle, acting as an independent Owner's Consultant



Deliverable Highlights

Assess the business case for an energy retrofit or solar rooftop

Act as project manager / owner's representative to manage the tendering, contracting, execution and commissioning process

Facilitate 3rd party financing based on project viability and client's bankability

Short-list qualified service providers and investors, in line with Client's constraints, bandwidth, capability, procedures and investment appetite

Provide legal support to draft and execute **Audit Development Agreements, Energy Savings Performance Contracts and Solar Leasing agreement** that governs the relationship with the service providers for the duration of the contract

Provide **in-depth commercial and technical expertise** to thoroughly check and approve the detailed energy audit (IGA), method statements, implementation plans, detailed design drawings and material submittals to **alleviate design and implementation risks**

Integrate and provide client access to state-of-the-art and **independent digital energy management system (arkEMIS)** with artificial intelligence-enabled asset management platform and comprehensive suite of data analytics modules

Act as 3rd party savings measurement and verification auditor to **safe-guard** Client's savings for duration of energy savings performance or solar leasing contract

Client Experience and Competitive Advantage

For over 23 years, we have advised high-profile clients to develop and execute ambitious Energy Transition programs from strategy to implementation with active monitoring and evaluation

Our Competitive Advantage

Strong credentials and long-term relationships with high-profile public and private sector clients

Over 23 years of energy strategy consulting experience and implementation PMO with flagship projects incl. design, setup and program management of Dubai Energy Efficiency Strategy (TAQATI)

End-to-end expertise with proprietary methodologies and tools to develop and execute **Energy Retrofit and Solar projects** incl. technical, commercial and contractual advisory services as **Client's internal project manager / consultant**

Track record of value-creation with **project cost savings of up to 35%**, and **energy savings increase of 20%** vs. initial vendor proposals

Strong track record in **digitalization transformation of energy management** with our AI-enabled energy management information system (arkEMIS)

Vendor and technology agnostic with open-market approach to secure funding

Structured management consulting approach to facilitate C-level decision buy-in

In-depth benchmarking and industry outreach

Selected Clients

OEMs	Government	International Org.
 	      	   
Healthcare	Industrial	Commercial & Residential
   	     	     



Your Trusted Energy Efficiency Solutions Partner

For clarifications or questions, please contact:

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E: aref@arkenergy.ae

Market Outlook for ESPC Contracts

Shared Savings Energy Performance Contracting is projected to be the fastest growing funding model in Dubai for the next 10 years

Energy Performance Contracting Market
(GWh, 2016-2018 actual, 2019-2022 forecast, 2022 - 2030 outlook)

