

Understanding the Energy Performance Contracting (EPC) model and process

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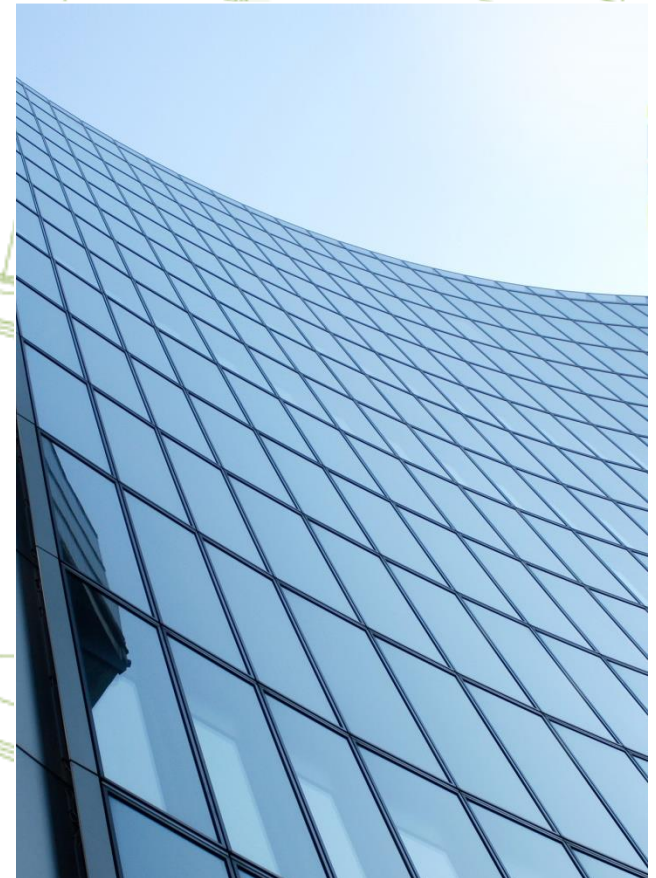
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ENERGY EFFICIENCY

International Energy Agency (IEA):

Energy Efficiency (EE): a way of managing and restraining the growth in energy consumption.

Something is seen as more energy efficient if it delivers more services for the same energy inputs, or the same services for less energy input



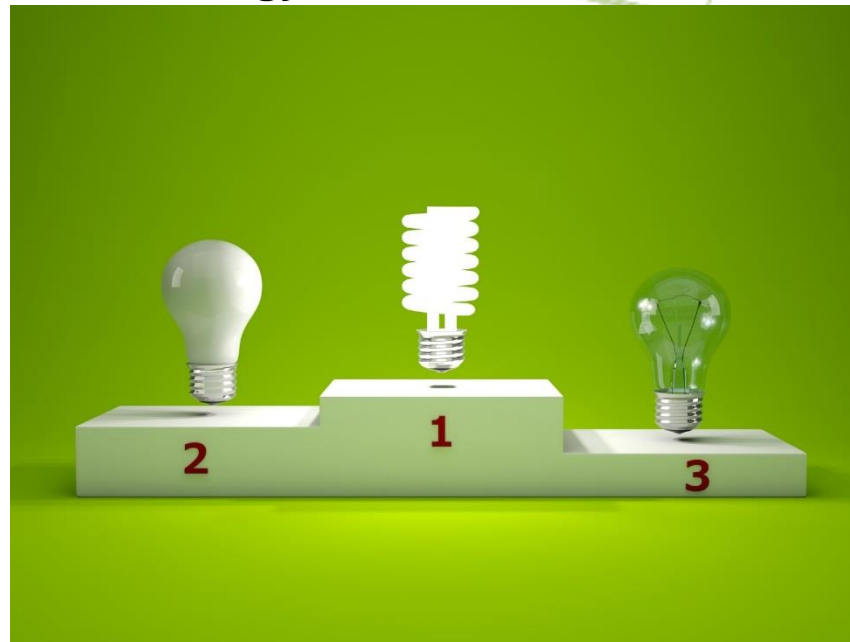


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ENERGY EFFICIENCY

e.g. when a compact fluorescent light (CFL) bulb uses less energy (1/3 to 1/5) than an incandescent bulb to produce the same amount of light, then:

CFL is considered to be more energy efficient



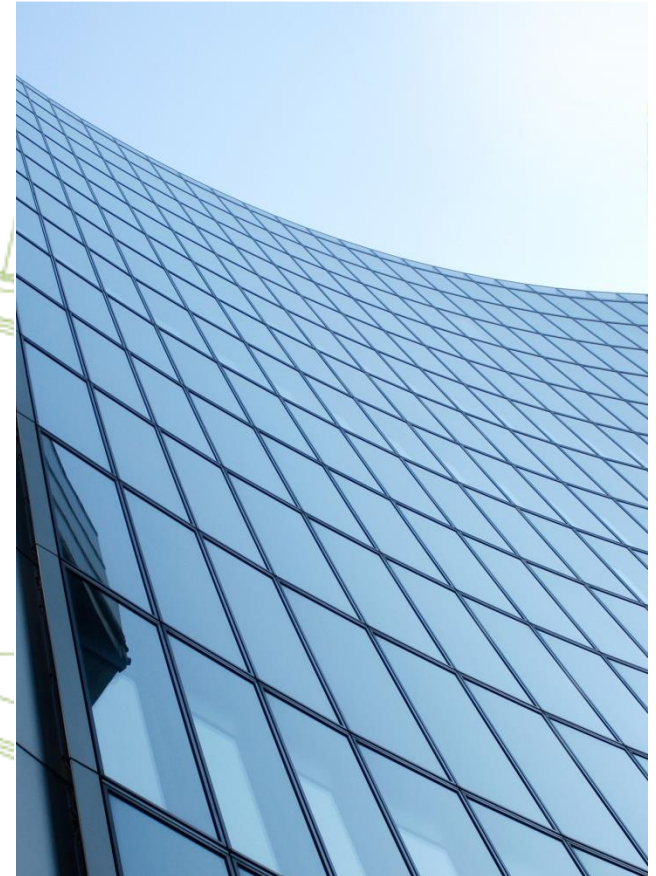


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ENERGY EFFICIENCY

Energy Efficiency Improvements offer many advantages to customers, such as:

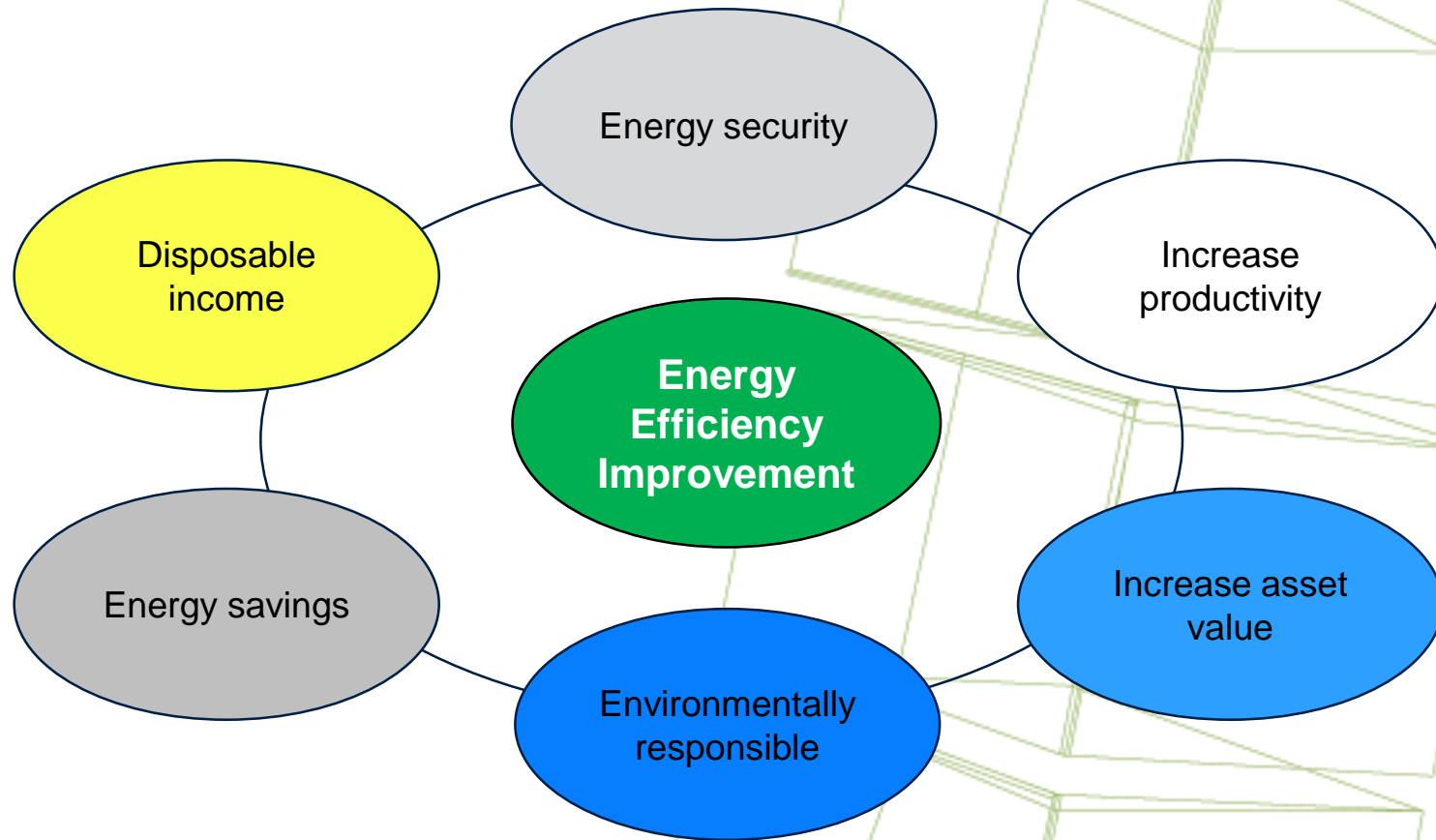
- **Energy security:** e.g.: when RES are installed ,they offer energy independence
- **Energy savings:** due to the reduction obtained through efficiency
- **Increased asset value**
- **Disposable income,** obtained from new savings
- **Increased productivity**
- **Environmental responsibility**





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ENERGY EFFICIENCY





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ENERGY EFFICIENCY

Energy Efficiency and EPC projects use different measures to improve conditions on tertiary sector facilities. Most common are:

Lighting

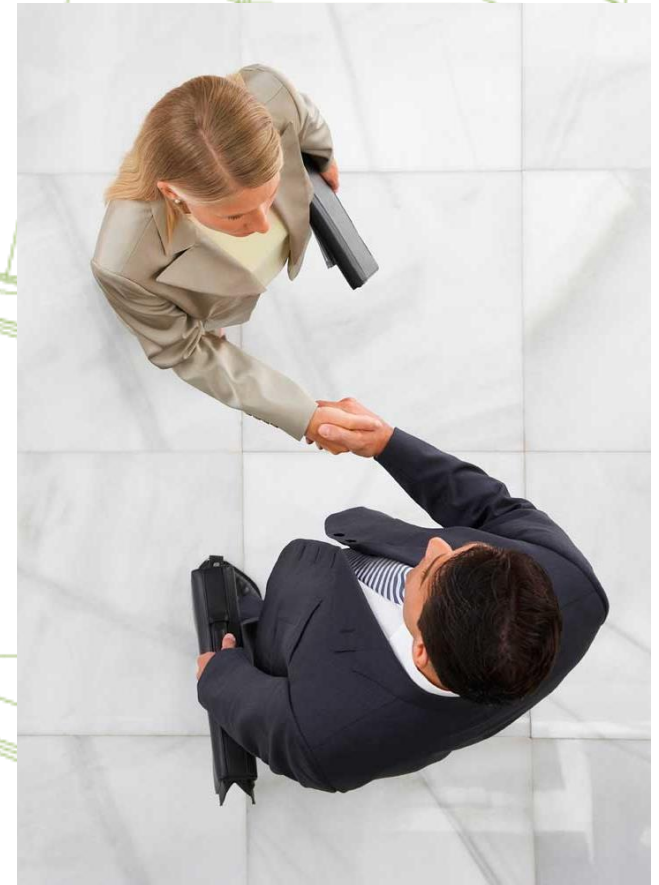
Heating & Cooling

Refrigeration

Domestic Hot Water

Equipment & others

Some of the measures that are implemented per category:





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ENERGY EFFICIENCY

Lighting

- Substitution of incandescent **lamps** with CFL or LED
- Occupancy and presence **detectors** in bathrooms and corridors
- **Photocell** to dim luminous flux based on natural light

Heating & Cooling

- **Substitution** of boiler burner, low efficiency heat pumps, windows, etc.
- **Installation** of high temperature cooling, variable frequency drives, curtains, etc.
- Improvement of thermal **insulation** of roofs, facade, etc.

Refrigeration

- **Substitution** of appliances with more efficient ones
- Installation of temperature detectors
- Proper **insulation** of doors and others

Domestic Hot Water

- **Substitution** of conventional boilers
- **Heat recovery** systems in chillers
- Solar thermal **panels**

Equipment & others

- **Substitution** of hydraulic motors in elevators
- **Substitution** of conventional appliances
- Installation of **RES**



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ENERGY EFFICIENCY

Segment / Measure	Retail	Hospitality	Education	Health	Offices
Lighting	5-40%	26-50%	20-65%	40-60%	40-70%
Heating and Cooling	20-60%	17-46%	10-40%	15-35%	10-40%
Refrigeration	5-30%	10-30%	-	10-20%	-
Domestic Hot Water	-	15-52%	-	10-50%	5-20%
Equipment and others	1-2%	5-10%	15-30%	-	5-15%



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EPC

Energy Performance Contracts (EPC)



Energy Performance Contracts are contractual arrangements **between the beneficiary and the provider** of an energy efficiency improvement measure, verified and monitored during the whole term of the contract, where investments (work, supply, service, etc.) are **paid for in relation to contractually agreed level of energy efficiency** improvement or other agreed energy efficiency criterion, such as financial savings

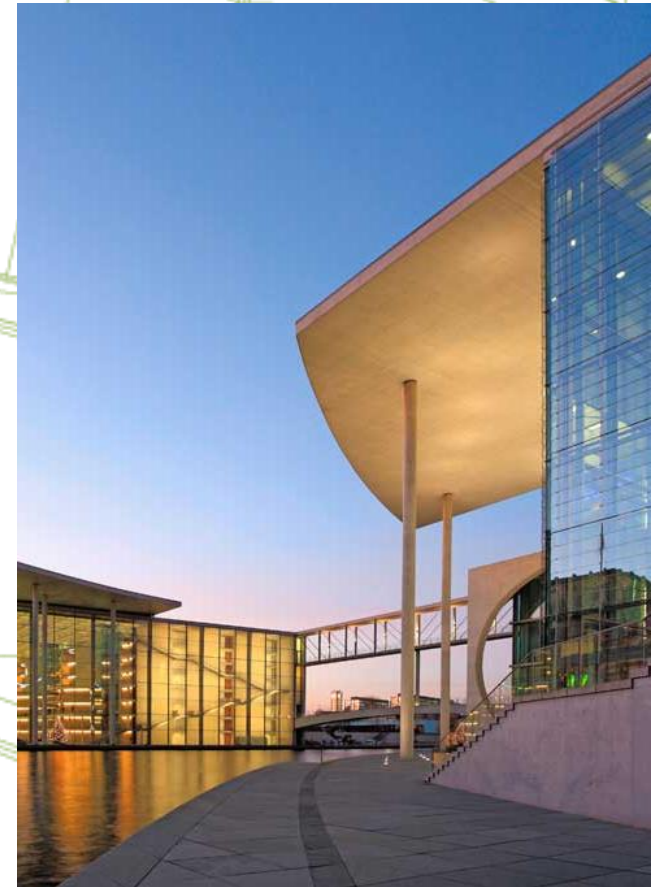


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EPC

Energy performance guarantees can be incorporated into contracts with service providers, contractors or product suppliers, so that some or all of performance **risk** is transferred **to the supplier**.

Service providers, contractors and product suppliers as **Energy Performance Contracts Providers (EPC Providers)**. These may also provide or source finance for the energy efficiency investment, but it is not a prerequisite.



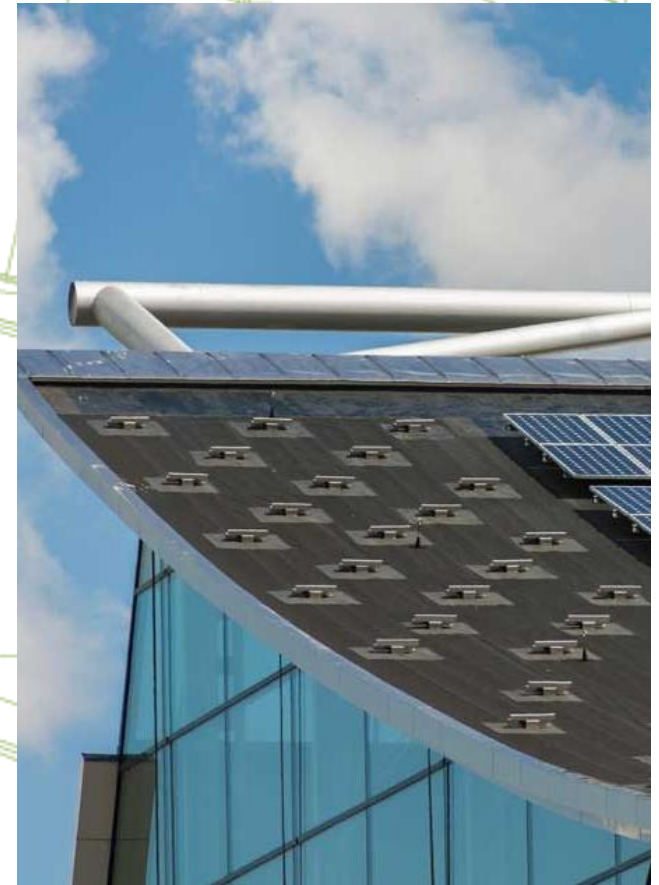


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EPC

EPCs are not structured around the supply of a physical product or service, but around the **desired outcome**, such as energy savings and/or equipment renewal.

These are generally long term contractual agreement where the customer benefits from new or upgraded energy equipment, and **the providers payment is directly tied to the energy savings achieved.**



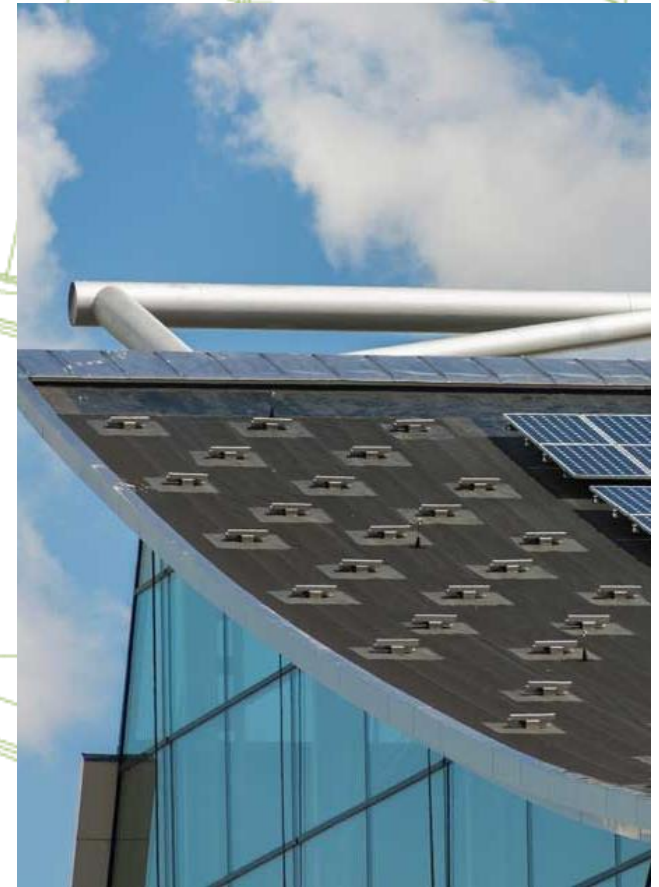


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EPC

EPCs are more than just financing mechanisms.

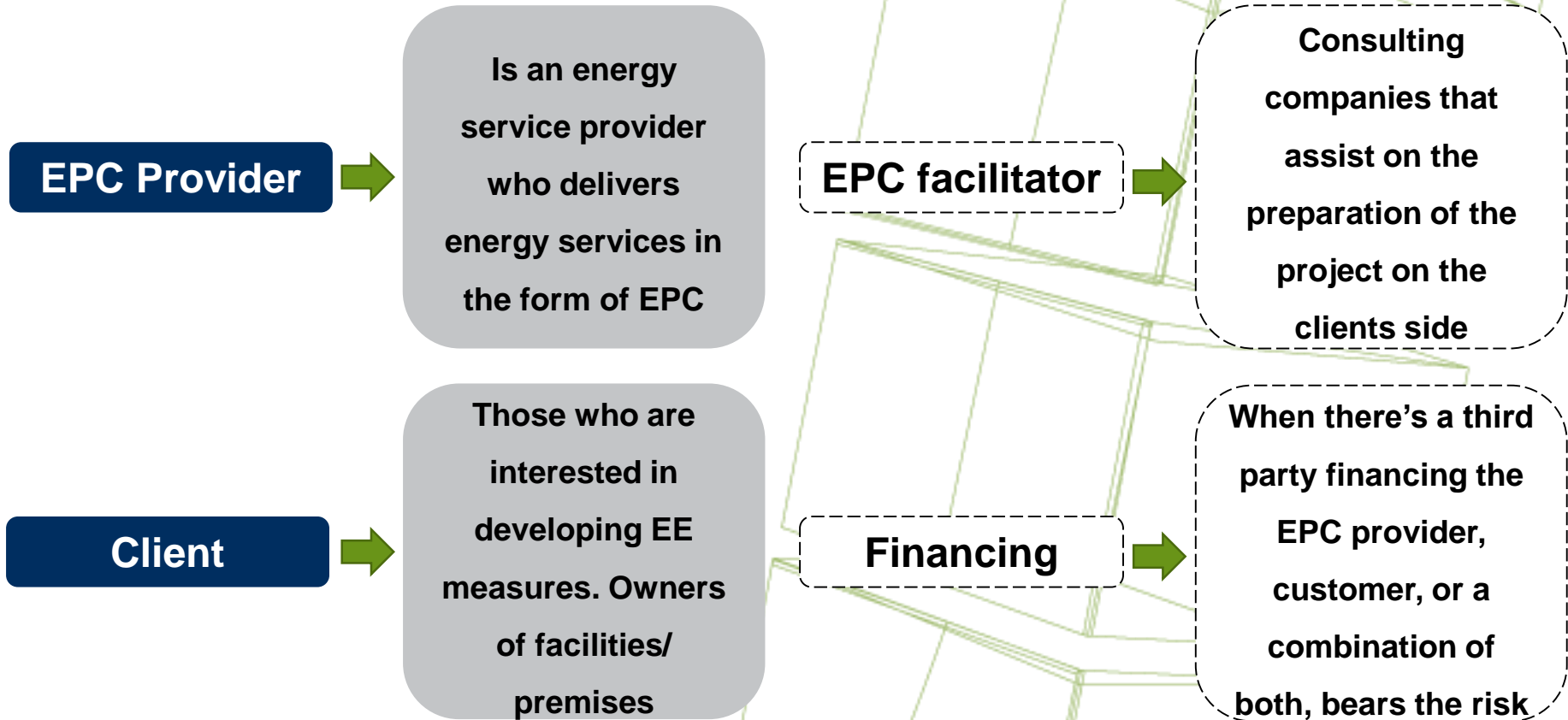
They are programs of practical engineered energy efficiency measures that are implemented in buildings **to deliver real energy savings** through heating, ventilation, air conditioning, lighting, peak load management, thermal insulation, controls and building fabric improvements.





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EPC



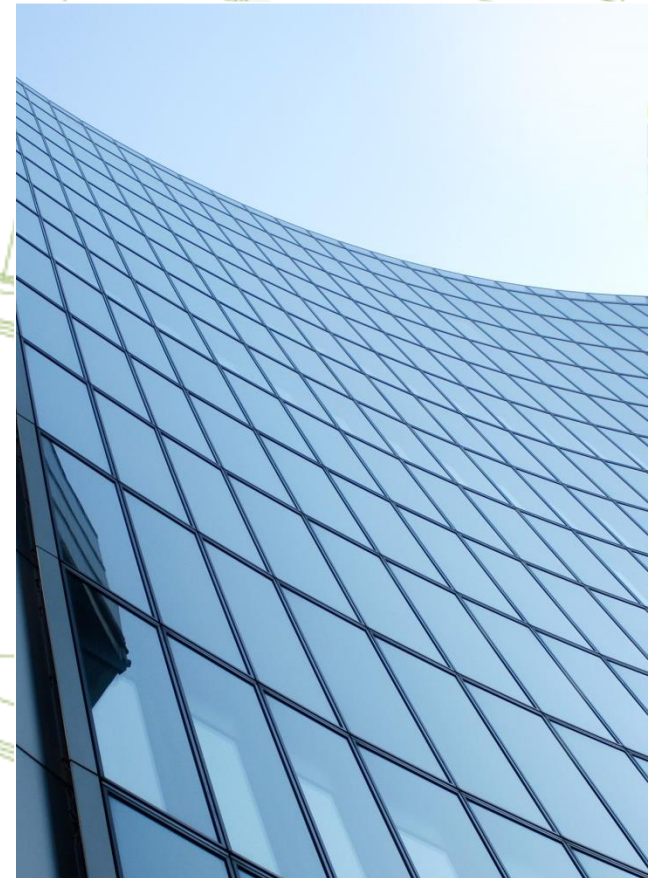


EE & EPC BENEFITS

EPC projects are seen as an opportunity for clients to develop energy efficiency measures in their facilities without making an investment on equipments

- **EPC Provider guarantees energy savings:**

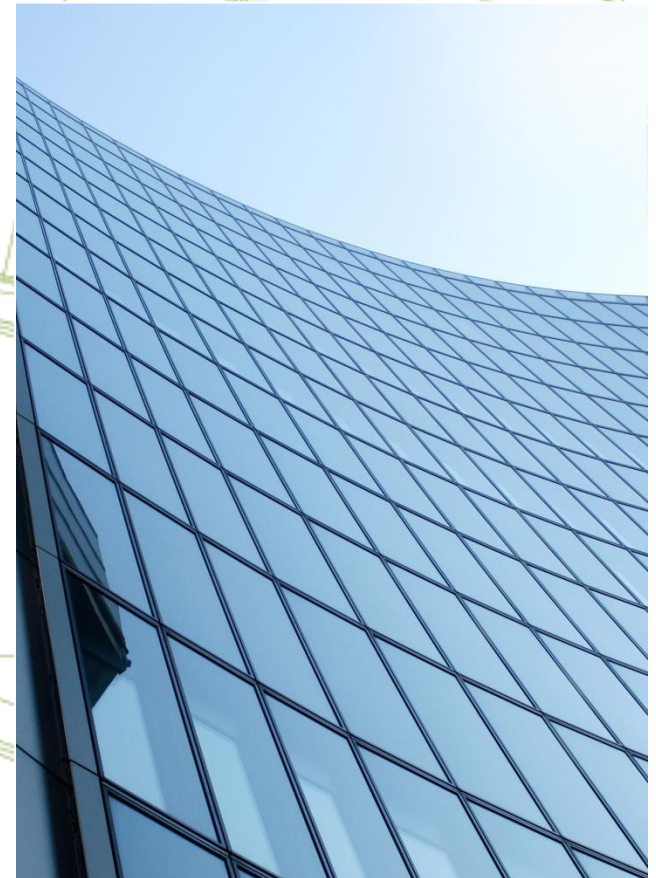
- EPC provider will be highly motivated to achieve energy savings and avoid possible rebound effect





EE & EPC BENEFITS

- **Level of financial savings guaranteed through EPC**
- **Technical risks and responsibilities are covered by EPC provider**
- **Planning process coordinated by EPC provider**
- **Less consumption with desired comfort levels**

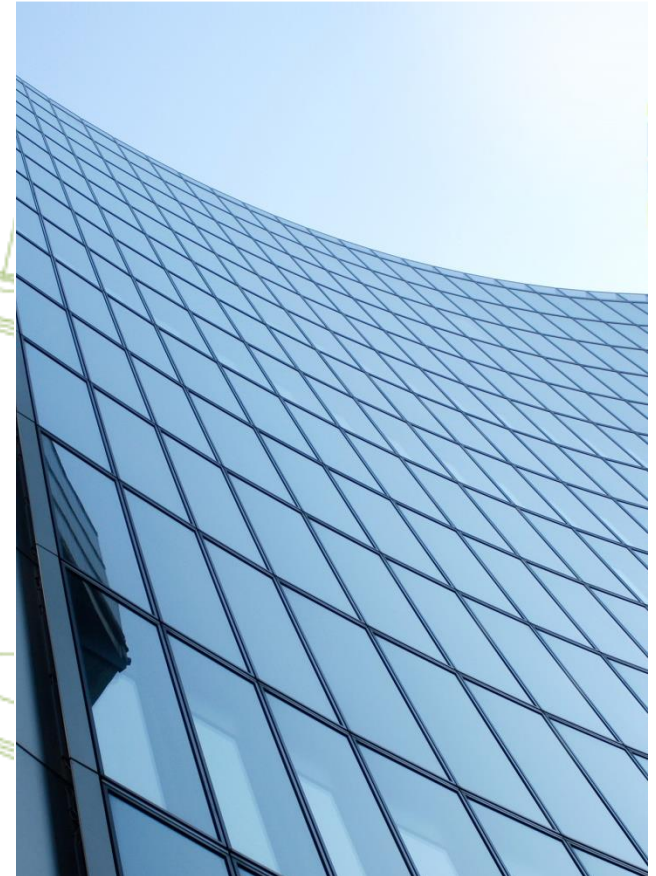




EE & EPC ROADBLOCKS

The **lack of knowledge** of the business model has **generated a lack of trust** from the demand segment. These roadblocks need to be overcome to develop the whole market potential:

- Client has to proactively ask for yearly audits
- Lack of knowledge of protocols used to evaluate efficiency of measures and financial savings of the project

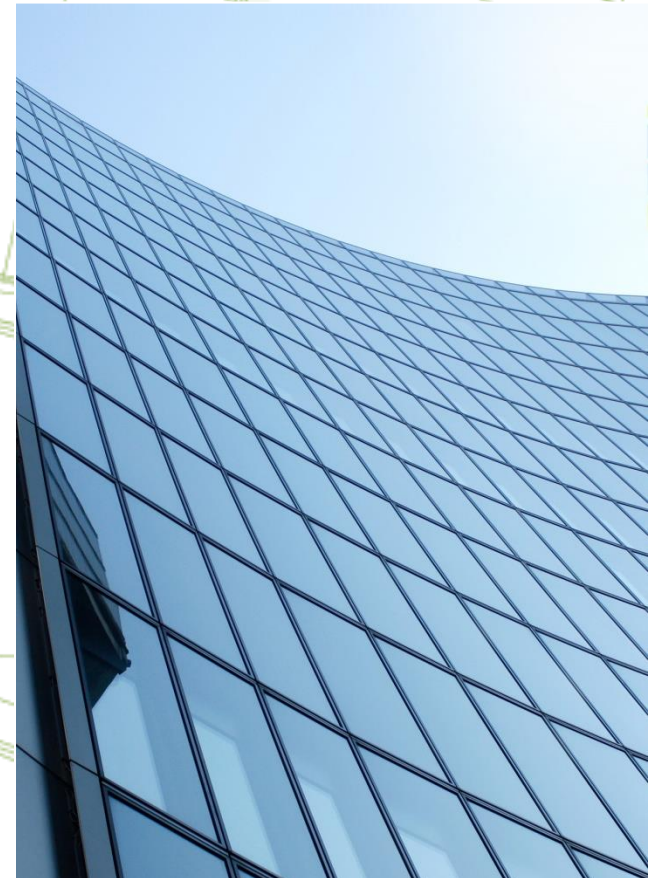




EE & EPC ROADBLOCKS

These roadblocks need to be overcome to develop the whole market potential:

- **Lack of knowledge of the business model from the customer, which generates a lack of trust in EPC provider and in project potential**
 - EPC projects are long relationships and therefore need trust





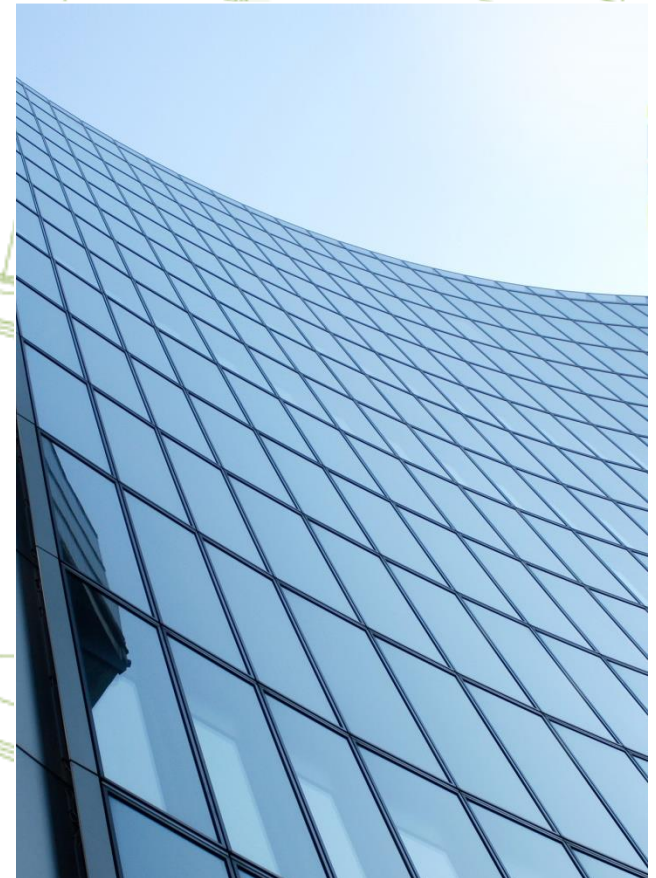
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WHY EPC?

Generally, EPCs are used to implement energy conservation measures for building technologies such as heating, ventilation, AC and others that often have **payback periods <10 years**.

However, these can also be used for building envelope refurbishment. Which result in a large portion of the overall energy saving potential.

Basically, a customer can develop a comprehensive refurbishment for the building that can last **>30 years**.

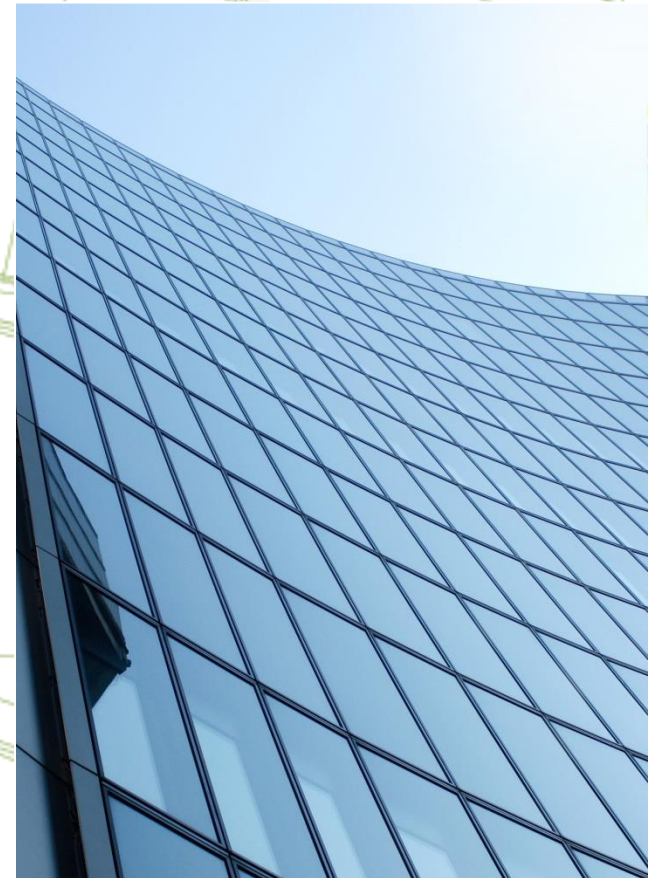




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WHY EPC?

In a nutshell, the main benefit of an EPC is the possibility of transferring technical performance risk using a turnkey solution with guaranteed energy savings (and maintenance), and using those savings to cover the investment cost.

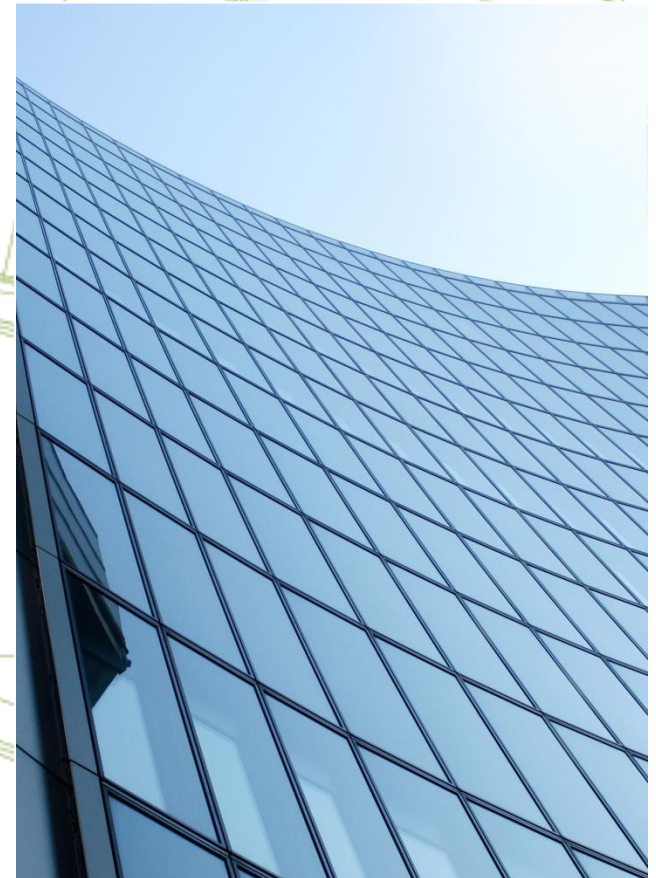




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MAIN CHARACTERISTICS

- There is **no need of up-front capital** from the customers side:
 - The capital needed to finance the project can come from the EPC provider, the client or a third party
- The **EPC provider offers all services** required to design and implement the project in the customers facilities

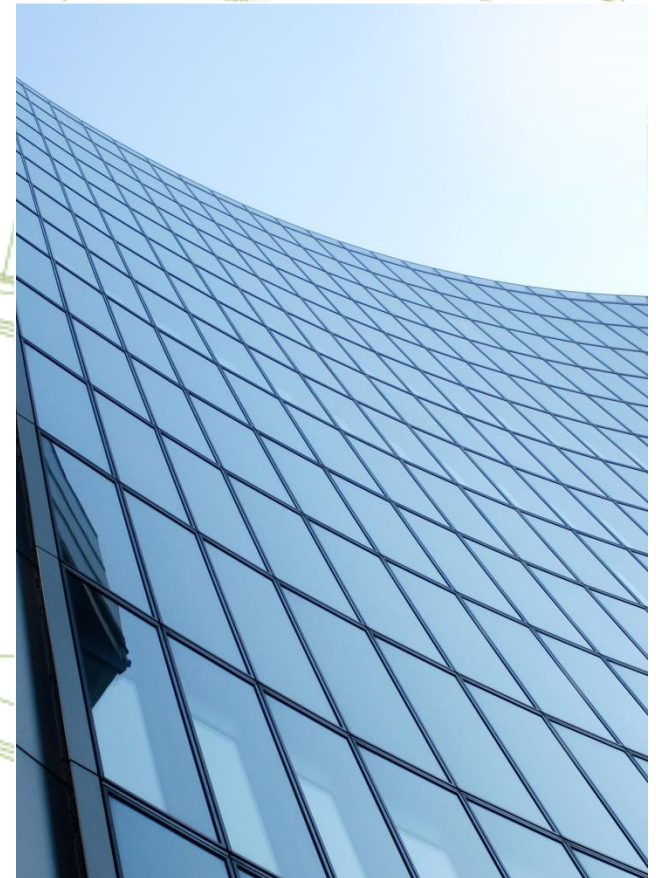




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MAIN CHARACTERISTICS

- The EPC provider has to assume the contractually agreed performance **risks** of the project
- The EPC provider guarantees the achievement of the agreed level of savings
 - In the case of a shortfall it must compensate savings



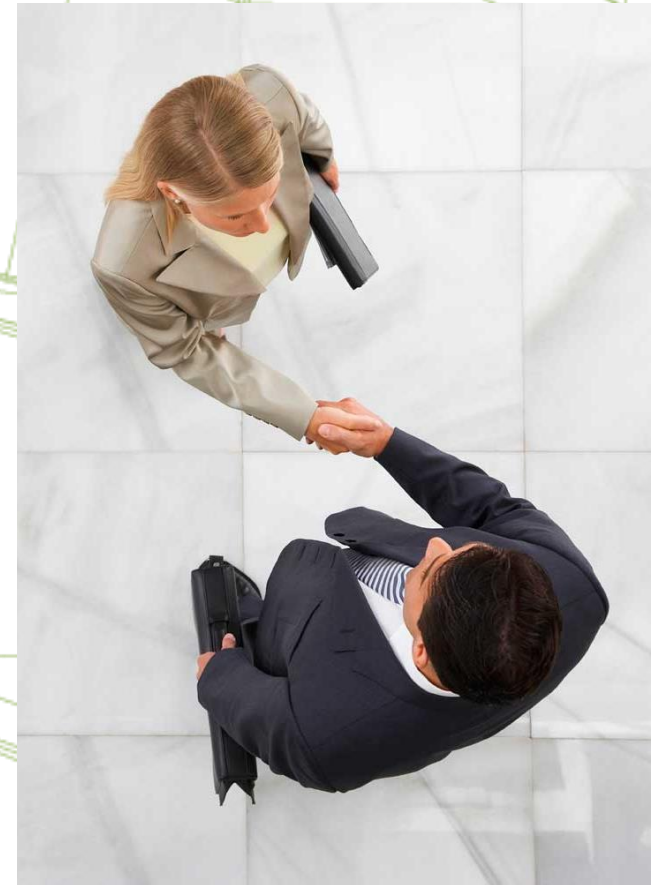


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TYPE OF CONTRACTS

Two major performance contracting models:

- Under a **shared savings contract** the cost savings are split for a pre-determined length of time in accordance with a pre-arranged percentage
 - There's no standard split, as this will depend on project costs, contract length and risks taken
- Under a **guaranteed savings contract**, the EPC Provider guarantees a certain level of energy savings and shields the client from performance risks



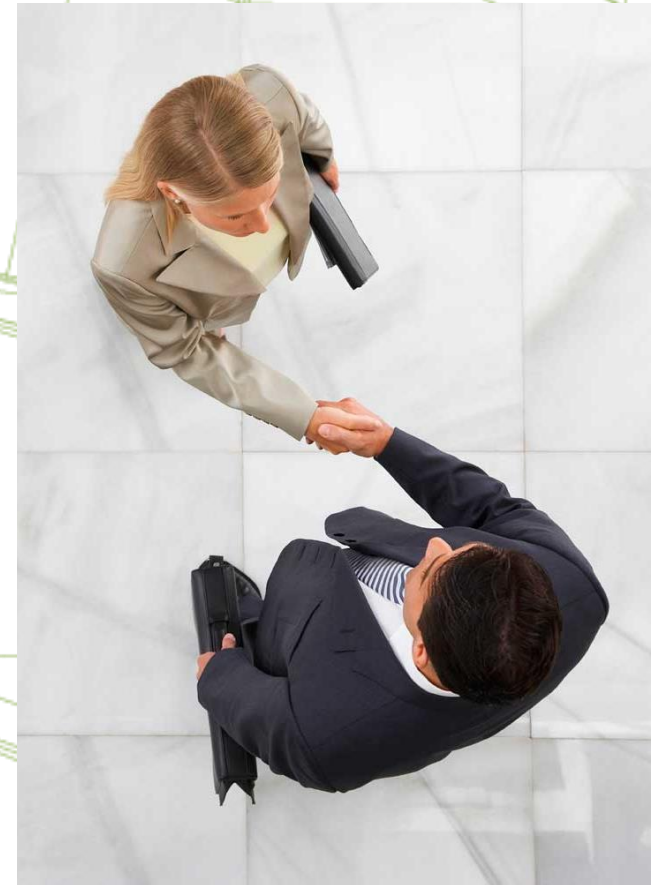


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TYPE OF CONTRACTS

Under a guaranteed savings contract, the EPC Provider usually takes over the entire performance and design risk

- For this reason it's unlikely to be willing to further assume credit risk
 - Customers are financed directly by banks or by a financing agency. The customer repays the loan and assumes the investment repayment risk
 - If the savings are not enough to cover debt service, the EPC Provider usually covers the difference

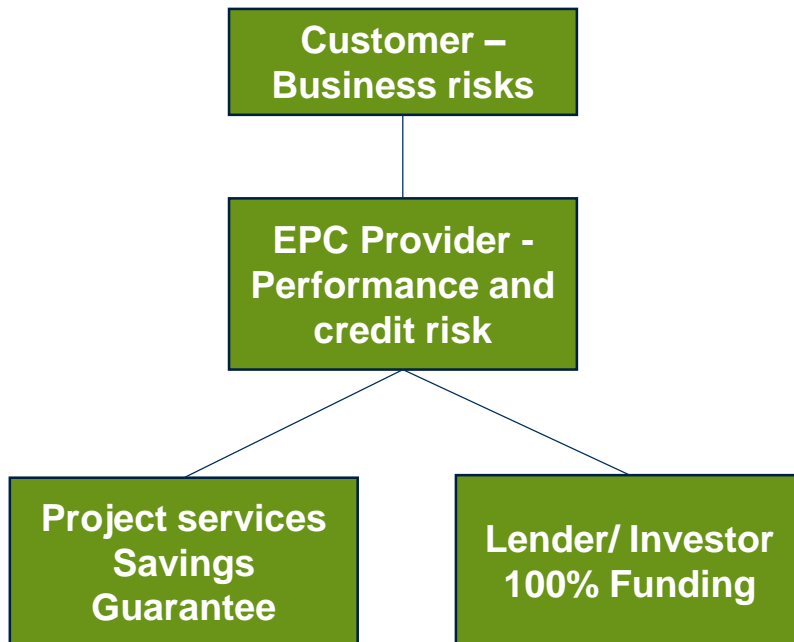




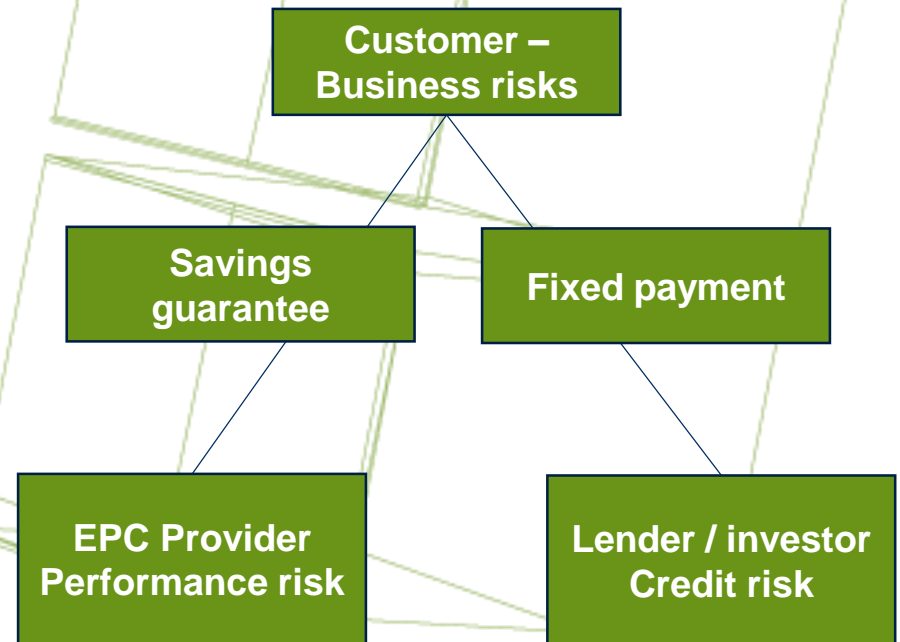
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TYPE OF CONTRACTS

Shared Savings



Guaranteed Savings



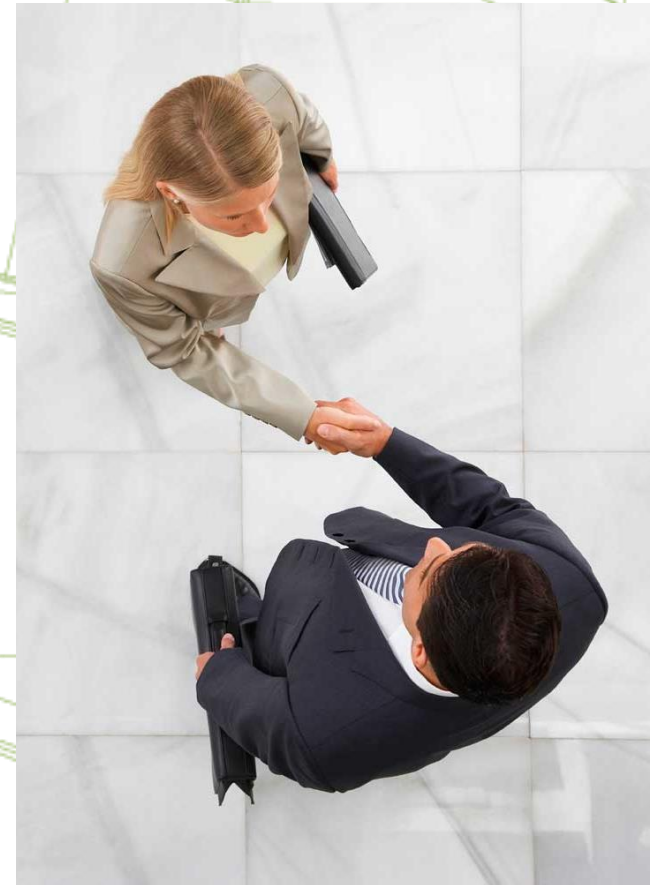


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TYPE OF CONTRACTS

The guaranteed savings scheme is likely to function properly in countries with **a well established banking structure, high familiarity with project financing and sufficient technical expertise within the banking sector to understand energy efficiency projects.** It is difficult to introduce this concept in developing markets because it requires customers to assume investment repayments risk.

However, it fosters long-term growth of providers and finance industries



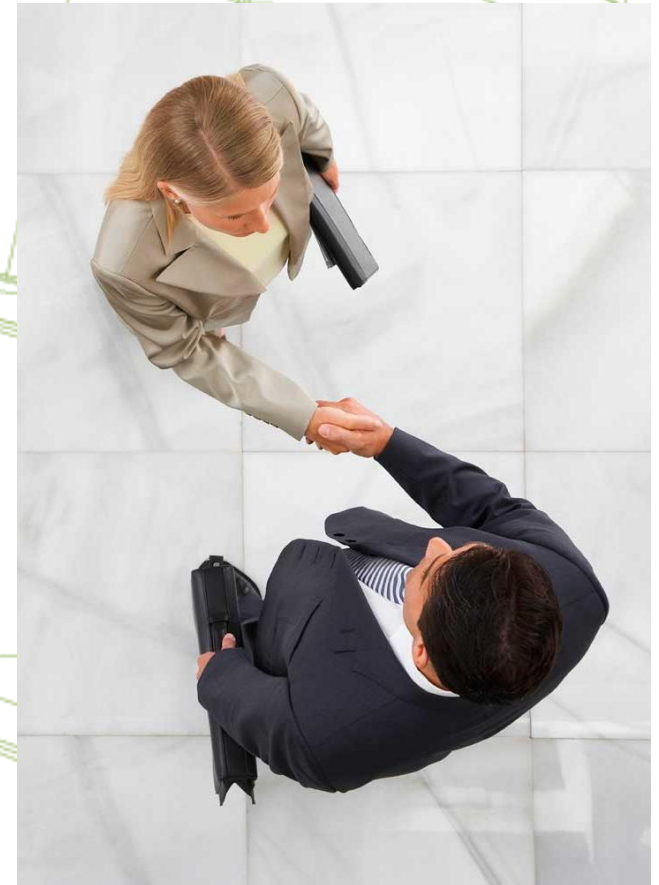


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TYPE OF CONTRACTS

Under a shared savings contract, the client takes over some performance risk

- For this reason it's unlikely the client has to assume credit risks
 - On this case the EPC provider usually assumes both credit and performance risks
 - To avoid energy price changes, it is possible to stipulate in the contract a single energy price





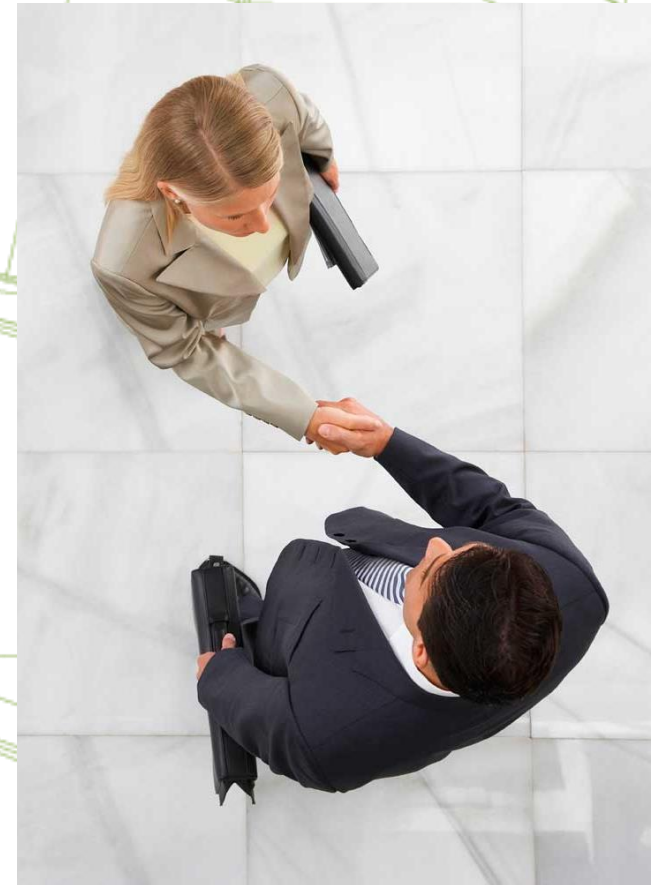
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TYPE OF CONTRACTS

The shared savings concept is **a good introductory model in developing markets because customers assume no financial risk**. From the EPC provider perspective this perspective has the added value of the financing service.

However, this model tends to create barriers for small companies.

- **Small EPC providers that implement this projects rapidly become too highly leveraged and unable to contract further debt for subsequent projects**





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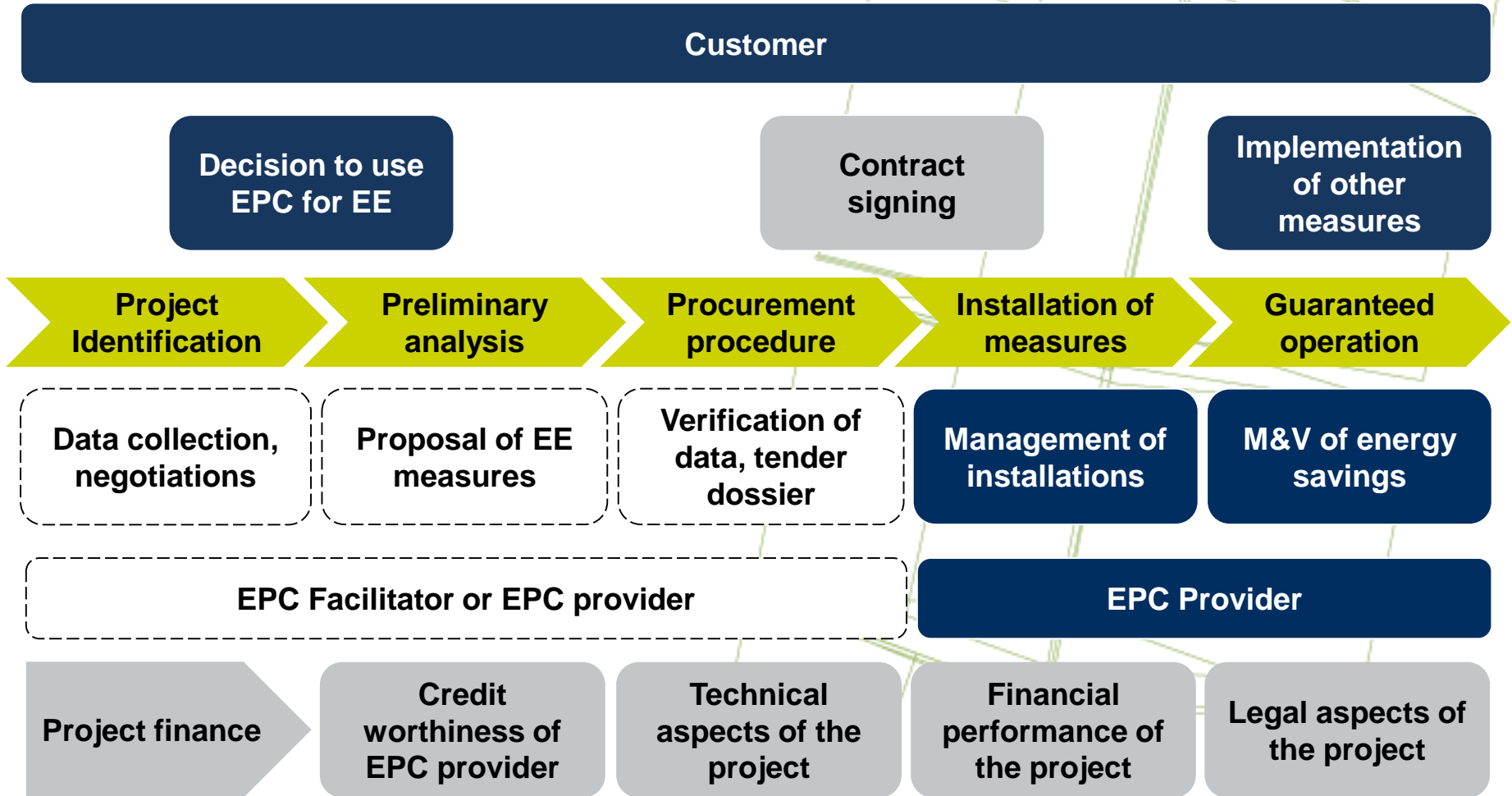
TYPE OF CONTRACTS

Guaranteed Savings	Shared-Savings
<ul style="list-style-type: none">• Performance related to level of energy saved• Value of energy saved is guaranteed• EPC provider carries performance risks / customer carries performance risks• Requires creditworthy customers• EPC provider can develop more projects without getting highly leveraged• Might seem more comprehensive	<ul style="list-style-type: none">• Performance related to cost of energy saved• Value of payments to EPC provider is linked to energy service• EPC provider carries performance and credit risks• Can serve customers that do not have access to financing• Favours large EPC providers• Favours projects with short payback



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EPC PROCESS





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EPC PROCESS

PROCUREMENT PROCEDURE

Project
Identification

Preliminary
analysis

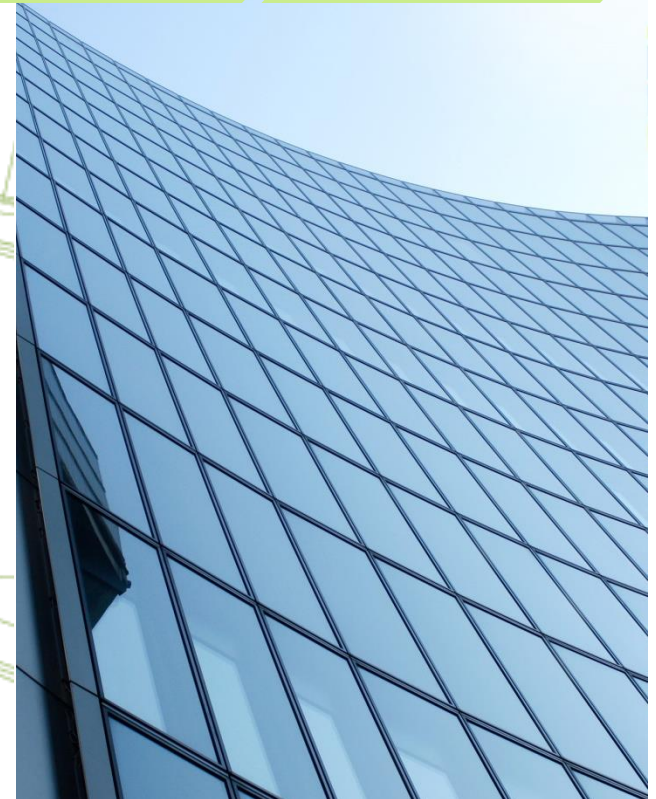
Procurement
procedure

Installation of
measures

Guaranteed
operation

The financing for EPC projects can come from:

- A third party offers a credit to the EPC provider or to the customer to develop the project
- The EPC provider, financing with internal funds
- The customer, which could finance with internal funds or borrowed from customer's internal capital expenditure (CAPEX)
- Combined effort from EPC provider and customer





EE & EPC EPC PROCESS CONTRACTS

Project
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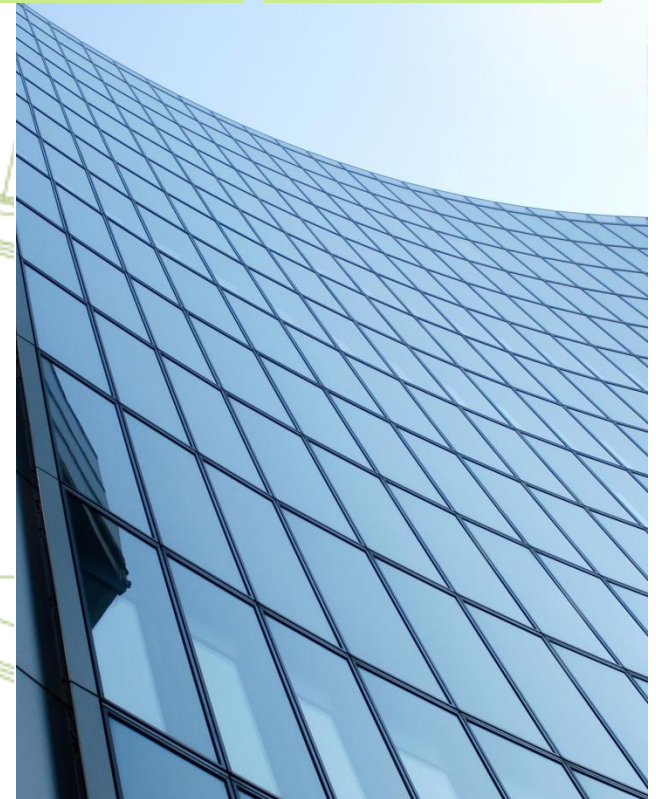
Procurement
procedure

Installation of
measures

Guaranteed
operation

The Energy performance contract must contain guarantees for savings and regulations for allocations of financial and technical risks. Some of the components of the contracts are:

- Duration of contracts
- Volume of investment
- Client obligations
- Process for implementation of measures
- Project implementation timetable
- Achieved savings evaluation method





EE & EPC EPC PROCESS

IMPLEMENTATION OF MEASURES

Project
Identification

Preliminary
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Procurement
procedure

Installation of
measures

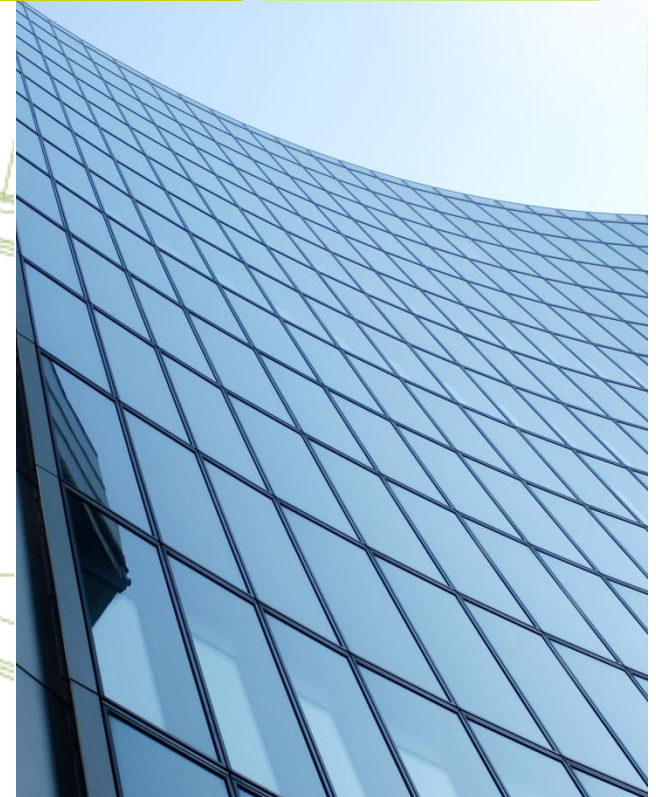
Guaranteed
operation

After the contract is signed, the EPC Provider develops the project according to the agreement established by contract

- A timeframe should be established for all measures to be implemented

All energy efficiency measures implemented must follow international standards

- The EPC facilitator (if present) could verify that this condition is fulfilled





EE & EPC EPC PROCESS

IMPLEMENTATION OF MEASURES

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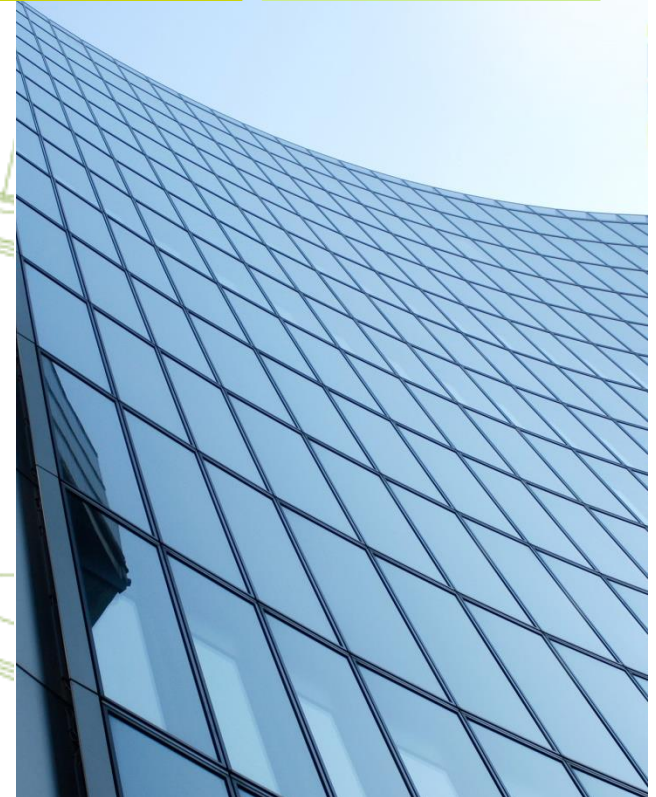
Procurement
procedure

Installation of
measures

Guaranteed
operation

The EPC provider should offer an appropriate training in order to insure the customer has a correct utilization of new equipments

- This would help obtaining maximum profitability from implemented measures
- The EPC facilitator can also provide training for the customer





EE & EPC EPC PROCESS

MEASUREMENT & VERIFICATION

Project
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Procurement
procedure

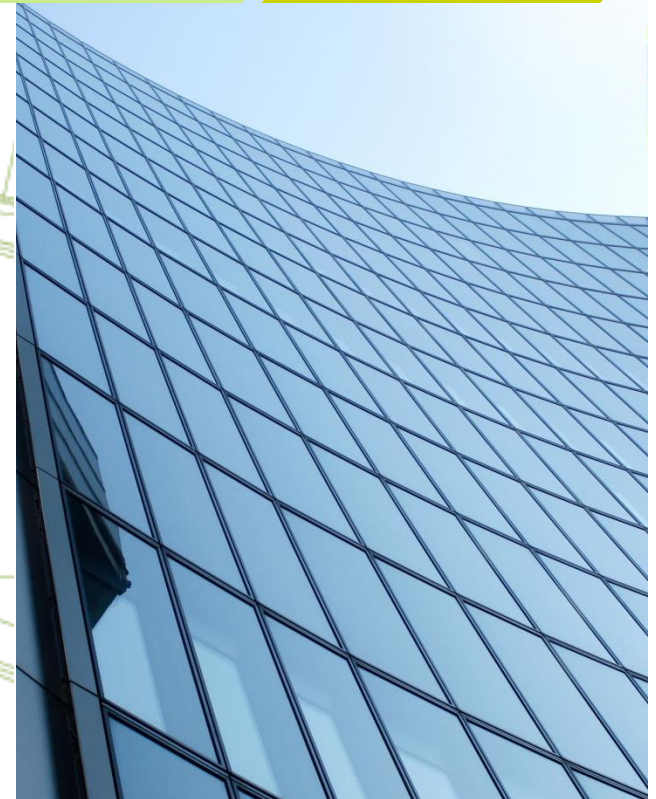
Installation of
measures

Guaranteed
operation

Savings, of course, are a measure of avoided energy use and cannot be measured directly.

They are established by comparing measured energy use before and after implementation of energy conservation measures with adjustments for changes in weather, occupancy, opening hours, production, etc.

Records of energy use before any changes are made, or Baseline Energy use, are invaluable.





EE & EPC EPC PROCESS

MEASUREMENT & VERIFICATION

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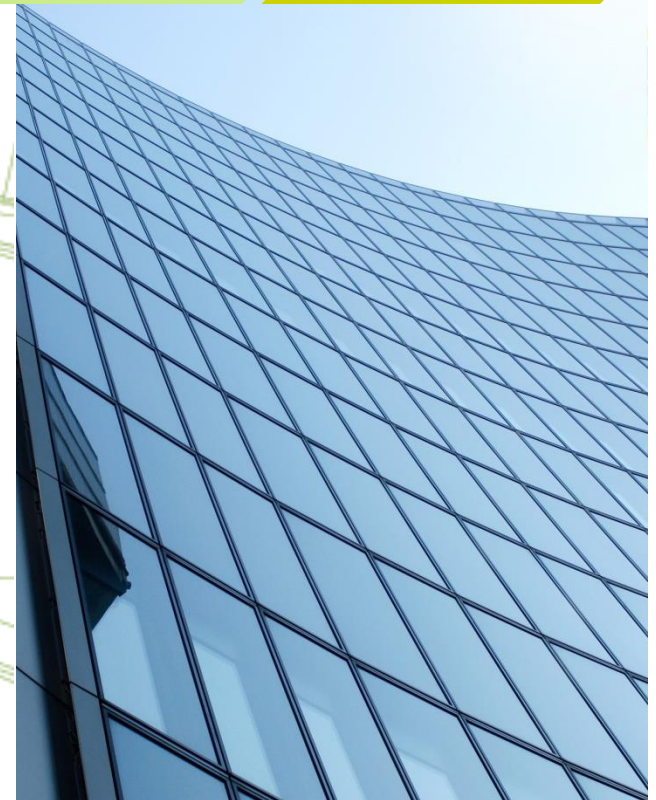
Installation of
measures

Guaranteed
operation

When planning to measure and verify savings, a fundamental consideration is the Boundary, i.e. savings may be determined from measuring a portion of a facility.

The other fundamental consideration is how energy use will be measured to establish savings.

- Taking measurement of instantaneous electrical load
- Logging of energy use at regular intervals over a representative timeframe





EE & EPC EPC PROCESS

MEASUREMENT & VERIFICATION

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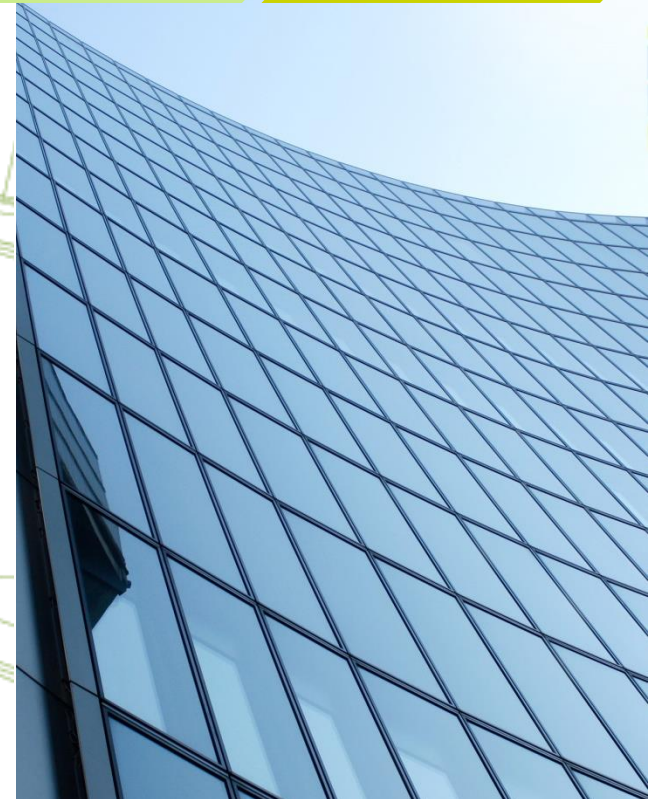
Installation of
measures

Guaranteed
operation

All these concepts are generally based on an established protocol, such as the International Performance Measurement and Verification Protocol (IMPVP).

Certified Measurement and Verification Professionals should provide guidance.

All contractual obligations regarding energy efficiency, financial savings and others have to be fulfilled by the EPC provider





EE & EPC EPC PROCESS

MEASUREMENT & VERIFICATION

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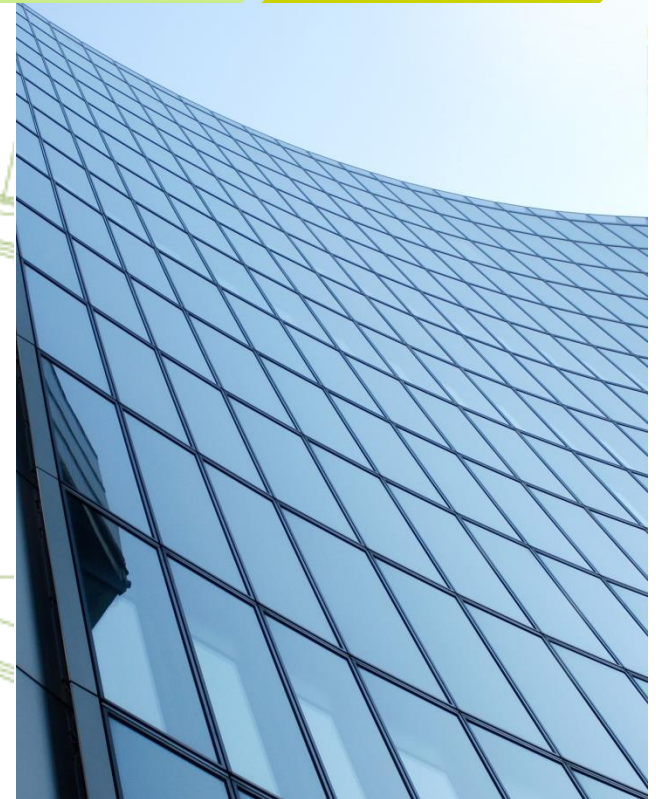
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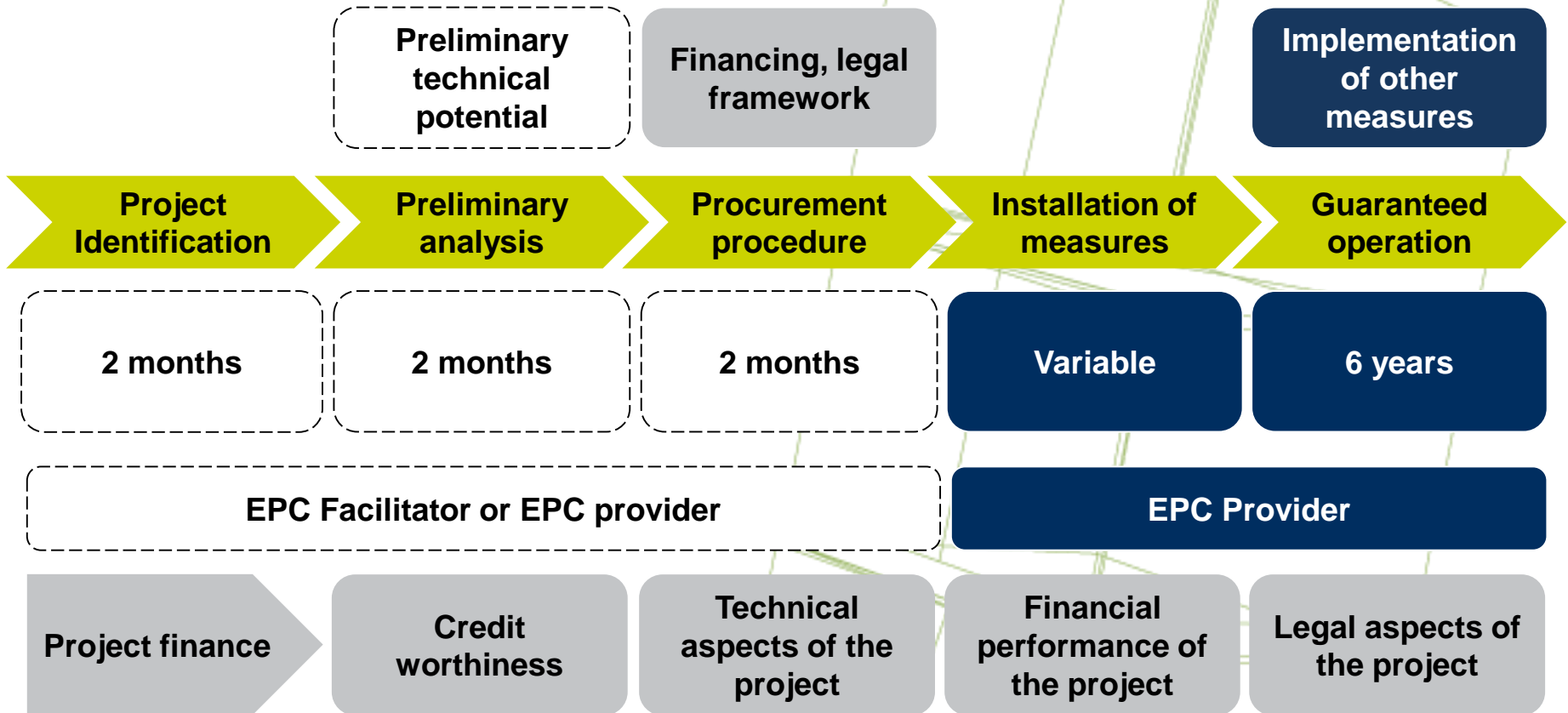
If energy savings, financial savings or any other condition established by contract is not fulfilled by the equipments and measures implemented by the EPC provider, it must implement additional measures in order to meet the pre-established terms

- Depending on the conditions established in the contract the EPC provider might have to incur in economical penalties in favor of the customer





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