SmartSPIN

Smart energy services to solve the **SP**lit**IN**centive problem in the commercial rented sector.

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D3.5 – CONTRACTUAL AND TARIFF TEMPLATES

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List of Abbreviations

Abbreviation	Meaning
BER	Building Energy Rating
BMS	Building management system
DR	Demand Response
DSM	Demand Side Management
DSO	Distribution System Operator
EE	Energy Efficiency
EEaS	Energy Efficiency as a Service
EPCe	Energy Performance Certificate
EPC	Energy Performance Contract
ESCO	Energy Service Company
ESG	Environment, Social, Governance
EU	European Union
EED	Energy Efficiency Directive
EEaS	Energy Efficiency as Service
FM	Facility Manager
FMCO	Facility Management Company
IGA	Investment Grade Audit
IPMVP	International Performance Measurement and Verification Protocol
KPIs	Key Performance Indicators
MEETS	Metered Energy Efficiency Transaction Structure
MoU	Memorandum of Understanding
M&V	Measurement and Verification
NOVICE	Horizon 2020 ESCOs with Demand Response
O&M	Operation and Maintenance
PPA	Power Purchase Agreement
PV	Photovoltaic Panels for Solar Electricity Production
RES	Renewable Energy Sources
SENSEI	Smart Energy Services Integrating the Multiple Benefits from Improving the Energy Efficiency of the European Building Stock
SLA	Service Level Agreement
SMP	System Marginal Price

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EXECUTIVE SUMMARY

Task 3.5 overviews contract and tariff design for smart energy services. The task is split into two distinct subtasks A and B.

Subtask A deals specifically with the contract design and attempts to produce contract templates in addition to discussing key issues and differentiators between standard ESCO contract and the SmartSPIN type contract. The SmartSPIN model transferred to a contract template does certainly create some challenges that are not immediately apparent until a contractual framework is attempted. So, this element of the work package looks fundamentally at the SmartSPIN contract and the structure to support this and then looks at some key differentiating issues between standard energy services contract and a SmartSPIN template. Financial covenants, revenue stream distribution, post upgrade service life and collaborative clauses are some of the key areas that are covered. Firstly, the business models for the SmartSPIN concept were analysed to discover the most relevant model to implement a practical contract template that can be used to overcome the split incentive problem between Landlord and Tenant. This report, backed up by the analysis done in previous tasks D2.2 and D3.4 found that the output model - based on the EPC with performance guarantees model - was the most relevant. This is more commonly known as the ESCO model which is a variant of the traditional type where the capital cost of the installation is provided in return for a regular portion of the energy savings. In this case the capital for the energy efficiency upgrades is mostly provided by the building owner through a sinking fund or ESCROW account.
The fundamental stepping-stones to getting to a contract stage are multi-staged and generally include an initial quick survey then followed by an Investment Grade Audit (IGA). The latter would show the division of savings between the Landlord and Tenant. The IGA would also include KPIs and a pathway for both parties to reach Carbon neutrality based on implementing the Energy Conservation Measures outlined in the IGA. The engagement of both parties could be encouraged by the concept of green leasing to strengthen transparency. A suggested Memorandum of Understanding (MoU) added to the existing lease - with terms mutually agreed - could be a means to incentivise cooperation.

The contract template would preferably be a tri-partite model including Landlord/Tenant/ESCO. The template was designed so that it accommodates this possibility. In reality, this is not likely in the foreseeable future, and it is envisaged that most contracts will be bilateral between Landlord and ESCO. The estimation of savings will not only include energy but also Demand Side Management (DSM) type as outlined in previous European projects Novice and SENSEI. The performance guarantee of savings by the ESCO is an essential keystone and marketing tool for the overall process as it ensures that the client gets a financial return from the project. The means of distribution of savings was also considered and good examples of this could be trialled from experiences in Hungary and Germany. The Services Level Agreement (SLA) should be added to the existing contract. This will generally bring more comfort conditions for all, as more accurate controls will also include indoor air quality as well as temperature. The overall projects in this domain are heavily reliant on data storage and transfers and data protection measures are recommended.

Finally, a contract template is included in the appendix which is based on a practical ongoing example in Ireland. It is designed to be tri-partite but is more likely to bi-partite as is the case shown

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here. This contract can easily be modified for implementation in other European countries. Obviously, the legal conditions of the various jurisdictions will be relevant to each individual country.

Subtask B. investigates the creation of a new flexible/dynamic, electricity tariff structure that links the system marginal price, (SMP) i.e., electricity market hourly clearing price to the electricity price paid by the customer. This task led by Eunice attempts to compare 15-minute consumption data for clients with the SMP for every hour of every day using data provided by the authorised DSO. The monthly average SMP of each customer can then be determined so that the electricity invoice for each monthly period reflects the low profile, and price of electricity at a time. Therefore, allowing the creation of personalised flexible tariffs that will encourage customers to shift demand away from peak times.

EUNICE designed a flexible/dynamic tariff structure based on Greek Electricity Market's hourly System Marginal Prices (SMPs). The dynamic tariffs were applied in the I4G Office Building load profile in the context of a seasonal analysis for a typical day of selected months throughout a full year to showcase the load shifting and monetary savings potential within the Greek Demonstration Site. EUNICE firstly gathered the required historical hourly System Marginal Price (SMP) data from the Hellenic Energy Exchange Electricity Market and the authorised Greek DSO as well as hourly historical electricity consumption data from the smart meters installed in the I4G Office Building within the Greek Demonstration Site. The energy consumption data in combination with the dynamic tariff structure developed based on the SMPs, were utilised in order to calculate the electricity cost of the office building in order to investigate if the existing retail electricity prices reflect the real electricity prices (SMP) for every hour of a typical day. The results from the electricity cost calculation based on the flexible tariff were compared to the existing method of pricing, within the I4G Building, via a fixed flat rate tariff. Moreover, a sensitivity analysis was conducted from the perspective of an energy provider to investigate the potential marginal profits that could be acceptable in terms of customer's cost for a case of dynamic pricing based on a flexible tariff approach. As an outcome of the analysis, personalized flexible tariffs for each tenant as well as for the whole office building can be created encouraging customers to shift away demand from peak times reducing the cost of electricity consumption.

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1. INTRODUCTION

SmartSPIN addresses the innovative business solutions of smart energy services in commercial rented sector. This task sets out to develop contract and tariff templates that can be used by contract facilitators, ESCOs and project beneficiaries. This task seeks to cover a range of scenarios that is believed to be covering the majority of situations and to develop contract and tariff templates that can be utilised with minimal adaption in the market.

Compared to the existing models of energy performance contractual agreements between energy service companies and their clients, landlord-tenant landscape requires a case specific approach when it comes to the building energy services and investments around it. Throughout the project timeline, the service model has been defined to optimize the building energy services between ESCO, landlord and tenant. The business model proposition will further be finalised at the later stages of the project development.

When it comes to facility management and obligations, commercial rental properties might bring case scenarios where ownership and control vary or are divided between tenant, landlord or third-party organisations such as property/facility management companies. Depending on the tenancy period, ownership and management flexibility of the engineering services in the built environment, motivation of engagement of parties might vary.

Some commercial buildings offer all-inclusive service premises to tenants where landlord owns and manages energy plant as well, where in others tenant might have been rented a shell building where the tenant ownership is higher. Today, in many scenarios, there is a combination of landlord and tenant owned energy and building systems in a building, and this can create a complex landscape for ESCO companies to agree, invest, clearly act, perform, demonstrate and operate.

The agreement between a tenant and landlord and scope of their agreement is significant for the distribution of roles and responsibilities. Traditional leases usually define the scope of premises for rent, period, payment, and linked obligations. For energy specific clauses, green leasing concept has been introduced to have additional sustainability clauses to the lease agreement or to have a linked Memorandum of Understanding between parties in addition to the leasing. In some cases where tenancy is a longer period, net lease agreements are introduced instead of traditional leases between landlord and tenant. With single, double, or triple net leases, the tenant agrees to cover one or more of the additional property expenses, such as tax, utility, insurance, and maintenance. So, for such cases where a tenant agrees to pay the property expenses including building maintenance in addition to rent and utilities, the tenant would be more willing to agree for energy and operations investment, and an energy performance contract between an ESCO and a tenant is more likely to be able to address the overall successful approach where the investments and gains are more focused on the sole user. Although, for leases where tenant do not agree to the building maintenance costs, building energy performance improvement investments could still be linked to the property owner landlords.

For a successful agreement between landlord, tenant and ESCO, a contract addressing the needs and obligations of all parties involved is important to define and agree the terms. The service definition proposed in SmartSPIN project has been reported under D3.4 SmartSPIN Service Definition. The SmartSPIN concept advises an approach to have bilateral agreement between ESCO

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/ Energy service provider and landlord or tenant, depending on the scope of work, while enhancing the landlord tenant relation and leasing agreement between two parties for energy services approach by introducing green leasing and building fund models. Tripartite agreement model between an ESCO, landlord and tenant could be introduced in specific scenarios where ESCO looks for a long-term agreement with large EPC investments which require risk mitigation.

Throughout the concept development, other research developments and projects in the market have also been analysed. In literature, throughout years, there have been several business model variations addressing energy services. NOVICE project covers business models incorporating energy efficiency and grid services with enhanced EPC templates for dual energy services scheme with a strong link between ESCO and Aggregator. SENSEI project combines the concept of pay for performance arrangements with energy performance contracting model. EPC+ project explores innovative SPIN transaction and provides toolboxes for energy savings calculations. While all these projects also bring innovative business model discussions for building energy performance agreements, they do not specifically focus on commercial rented sector, so the models do not cover the split incentive issue or involvement of both parties of tenant and landlord for energy performance contracting cases. To advance the implementation of agreements, contractual service definition and its scope must be further analysed. For the contractual discussions around SmartSPIN, the parties of the agreement and their roles around the contract must be redefined. Depending on the proposed energy service model, the agreement could be focusing on energy performance or energy as a service model with a larger scope. Although some parts under obligations and performance evaluation models could change, there are still some certain parts to cover under a service contract.

This conceptual design requires a modification to traditional energy performance contract models as the scope of work, the investment and revenue streams and obligations around the work change significantly for such building landscapes with multiple owners and/or users of the engineering systems. Moreover, considering further implementation of other smart energy services available and developing in the energy markets, such as implementation of smart tools and other dynamic models around real time controls, adjustments and involvement of other third-party energy ecosystem actors, the need for an innovative change approach to the energy service contracts become inevitable.

As SmartSPIN addresses more complex landscapes of smart energy services compared to a traditional energy performance contract, this innovative model also requires an innovative contract model which is aligned with the service definition. Following a service definition with specific case scenario parameters, a contractual model could be developed to be effectively used in the real market cases, tested further with demonstration cases of SmartSPIN project in Ireland, Spain, and Greece, and around Europe in a wider perspective. So then, successful business model approaches such as SmartSPIN can accelerate the commercial renovation and play a significant role in the smart and efficient transition of the built environment.

In the process of developing a smart energy service contractual template, there are various parameters to consider for a contract to be eligible and effective. A service contract should generally include: a description of the parties involved in the agreement, a description of the services to be performed, a description of fees and payment schedules, the effective date of the contract, when work will begin, the terms under which it can be terminated, agreed, and signed by both (all) parties.

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Furthermore, an energy performance contract should generally include: performance guarantees, calculation methodologies, scope of work and definitions, establishing baselines and savings, equipment health and data security, comfort parameters, payment (revenue streams), duration of works and contract period. For energy service agreements, the service provider assumes most of the risk. For a smart energy service contract, the model should address energy, comfort, maintenance and building value performance with measurement, verification, and control with smart tools.

A smart energy services contract can be signed between varying signatory parties of Energy Service Company (ESCO) or Technology Provider and Tenant or Landlord or Facility Manager company. Depending on scope of work, signatory parties and their obligations could be modified.

In business as usual, neither lease agreements between landlord and tenant nor energy performance contracts between client and ESCO adequately address energy related non energy benefits or issues around comfort, performance.

Due to the variety of building cases where the ownership and management of engineering services change from landlord to tenant, there are several versions of an ideal agreement model where one could work better than another. If an ESCO undertakes a risk of investment with an EPC model, then tenancy period and ownership of control systems are essential parameters to consider.

For some existing commercial rented cases from the market with some offices and shopping centres, landlord provides facility management services to their tenants. In such cases, landlords are more willing to be engaged as they act as service provider in the building business.

There is also the effect of sequencing of the upgrade work, so instead of ESCO providing an overall audit and bringing all subcontractors under one contract, energy management could start with a first stage low-cost no-cost management IoT based monitoring, analytics, and systems optimisations-based energy savings first stage that would benefit the complicated landscapes of multiple stakeholders of landlords, tenants and other facility workers. That first stage of monitoring and initial savings brings a stronger visualisation of further potential saving opportunities and a more advanced and analytics-based approach for further investment stage with involvement of more stakeholders. For (low-cost) initial optimisation measures, smart monitoring and analytics services could be installed as a first stage to better complete usage analyses and bring more advanced measures potentials based on detailed audits.

As the ESCO requires funding for this contract model and the contract entered by the ESCO forms an important part of the assessment process for funding. If the risk characteristics of the landscape become too high, then there is a risk that project finance cannot be secured. The strength of covenants with beneficiaries become very important. ESCO contracts have substantially originated in the public sector where strong covenants exist and with a single contracting entity. As this transfers through to the Landlord / Tenant landscape which can in part be Public Sector but ideally would be supported and get traction in the Private sector the risk profile and lenders perception around the security offered by contracts becomes important. It is probable that contract durations may need to be extended to offset increased risk and where tenants form part of the funding component then a requirement for the building owner to indemnify their contribution to offset absence or other financial difficulties a tenant might encounter effecting their ability to support agreed contract performance repayments to an ESCO. The equipment ownership and timing of its transfer to the beneficiary can also be a key consideration for lenders. Also, the question of whether equipment can be retrieved from a site and its value can also be a consideration for a project financing entity. The risk level around performance guarantees will also be assessed by lenders as a consequential risk to lending and both lenders and insurers will be more attractive to contracts where performance is not present or conservative and hence a low risk level. The presence of performance protection insurance can often offer comfort here.

Tenancy durations and agreements are likely to also form part of funders due diligence. Additionally, where required the levels of collaboration, data sharing and coordination within a tripartite energy services contract must ultimately be supported or developed within the landlord / tenant lease agreement and this would again be a necessary part of due diligence for a funder.

In electricity grids, supply and demand must be balanced at all times (Ulbig et al., 2014). As a means of ensuring this grid stability, dynamic electricity tariffs are frequently discussed as tools for demand-side management (Dutta and Mitra, 2017). Induced by price signals, customers respond to over- or under-supply in the electricity grid by shifting their electricity consumption, thus supporting grid stability and reducing the costly demand for peak-load capacity. As dynamic rather than constant prices per unit of electricity are better suited to reflect their short-run social marginal costs (SMC) of provision, the adoption of real-time pricing (RTP) tariffs is associated with an increase in overall economic efficiency. The nonmonetary added value resulting from load shifting induced by dynamic tariffs is its positive environmental effect. At a time when society is increasingly concerned about sustainability, incentives that facilitate pro-environmental behavior may be seen as an advantage by end customersFollowing economic theory, the price of a kilowatt-hour (kWh) is economically efficient if it reflects the short-run SMC of its provision (Borenstein and Bushnell, 2018). However, electricity is typically not sold at this optimal level. On the one hand, electric utilities can exploit market power and also need to recover high shares of fixed costs, which are not captured in the marginal costs of production. On the other hand, negative externalities are typically not internalized in electricity prices. While the discussion about the optimal level of fixed monthly fees is important, only the volume-based unit charges allow variations over time and are thus suitable to efficiently reflect time-varying costs.

Taking all aforementioned concerns and parameters into consideration, a contractual and tariff template development has been annexed to this report to be utilised and tested for smart energy services agreement models between service providers and building users, owners and managers.

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2. BUSINESS MODELS

Tasks D2.1 and D3.2 describes the various business models for smart energy services. These can be summarised as namely: asset, outcome and output-based models. The asset-based model is simply based on a lease agreement between a lessor and a building owner or a tenant. These are quite common in Europe with PV installations being a typical case where the lessor supplies and installs the equipment and charges the customers for the metered output. In the outcome-based model you pay for the level of comfort in terms of warmth or cooling rather than the generated heat in kWh. This model is sometimes known as the "Chauffage" model.

The focus of this section is on the EPC with performance guarantees model or more commonly known as the ESCO model. This really is a variant of the traditional ESCO model where the capital cost of the installation is provided in return for a regular portion of the energy savings. In this case assumption is that the capital for the energy efficiency upgrades is mostly provided by the building owner through a sinking fund or ESCROW account The model is summarized in Figure 1 below.

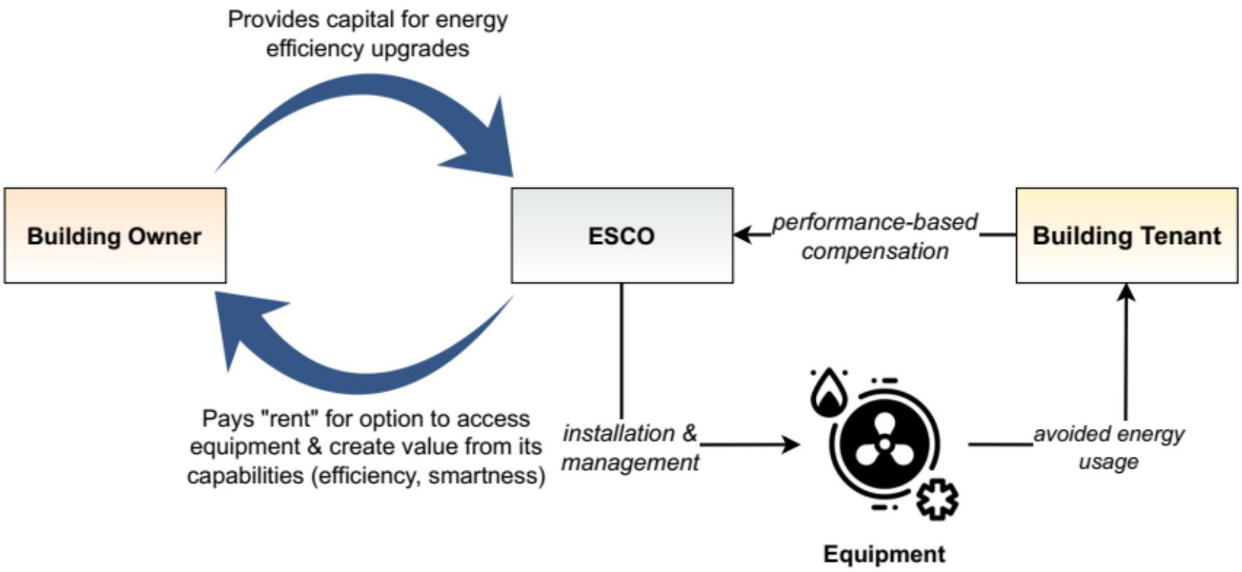

Figure1: EPC with performance guarantees.

The model also assumes the involvement of tenants through a green lease or other means – this may not be the case in most circumstances – but it should at least be aspirational in the medium term. It also overcomes the problem of the Split-Incentive in that both landlord and tenant have the common objective of reducing energy costs, improvement in the building energy rating and general appreciation of their respective assets.

Another model variant of interest Energy Efficiency as a Service (EEaaS). The EEaaS provider instead of the Landlord has an EPC with performance guarantees agreement with an ESCO/contractor, while receiving payments from the building user according to the achieved energy savings.

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This is generally in line with the findings of the previous task D3.4. It is also important to mention that considerable grants are available in many countries for energy upgrades and renewable incentives and that the Landlords are better positioned to avail of these. The following is an extract from the SEAI which is the national energy authority in Ireland. “Owner Management Companies (OMC) may avail of SEAI grants. An Owner Management company is defined as a private company which owns a series of residential dwellings. It is common for Owner Management Companies to own apartment blocks or an estate of houses for example”.

Low or zero interest loans are also available for these type of developments in many European countries.

3. CONTRACTUAL TEMPLATE

There are already contract templates that have been developed to provide contractual framework between the ESCO and a project beneficiary / recipient. As the model has been substantially promoted in the Public Sector in EU member states the contract templates that exist tend to be drawn up on behalf of a recipient and tend to protect and bias therefore the recipient in its drafting. Also, its important to note that the contracts that exist have substantially been designed for a two-party agreement without the complexity of shared beneficiaries that arise in the landlord / tenant scenario.

Our approach has been to use an EU Template that was revised for the Irish market by SEAI (Sustainable Energy Authority Ireland) for use in Public Sector contracts. The contract for use in the Private Sector and also split incentive landscape is likely to require further adaption. This additional landscape also encompasses suggested changes to existing landlord / tenant agreements in the form of Green Leases and additional sustainability based MOU's which will promote landlord tenant engagement and elements of these will be reflected in contractual templates – savings sharing, metering installation & monitoring, facilitation of upgrade works etc.

We have attempted within this task to offer key guidance in terms of the required adjustments however it is likely that individual Member State Legal, Legislative and Commercial nuances will need to be considered to achieve workable project contracts.

Contractual templates will have the following general elements typically:

1. Description of Building & KPI's
2. Description of the parties involved in the agreement,
3. Description of the services/works to be performed,
4. Determination of Building Energy Baseline
5. Energy Cost Savings Apportionment
6. Performance guarantee clauses & their calculation Methodology
7. Monitoring and Verification
8. Service Level Agreement (SLA) – Non Energy Related Criteria
9. Data security and management
10. Dispute Resolution
11. a description of fees and payment schedules,
12. the effective date of the contract, when work will begin, the terms under which it can be terminated, agreed, and signed by both (all) parties.

3.1 Description of Building and KPIs

This will include a general description of the building in terms of its location, age and fabric. It will also include digital mapping and breakdowns of the areas, volumes involved including landlord, common and tenant areas. The addition of Energy Key Performance Indicators (KPIs) and a roadmap of how the actions recommended will be essential to achieve Carbon neutrality by 2050 is shown (Fig. 2 and 3). This aforementioned data, while not essential for contract purposes, it is useful back-ground data for presentation and general motivation of the parties concerned. It also shows the Landlord that unless he undertakes these actions, the building concerned could be a future

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stranded asset. It also helps to distinguish the individual energy consumptions of landlord and tenant so that future energy savings can be apportioned correctly.

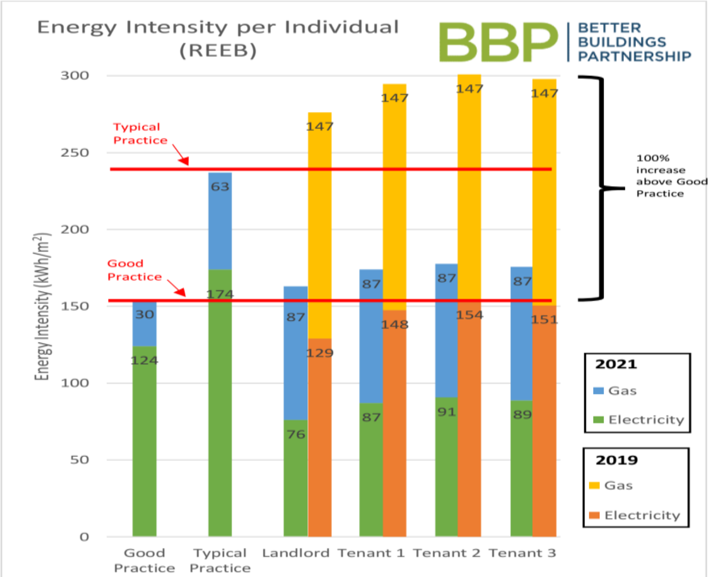

Fig 2: KPIs for Landlord/Tenant Areas

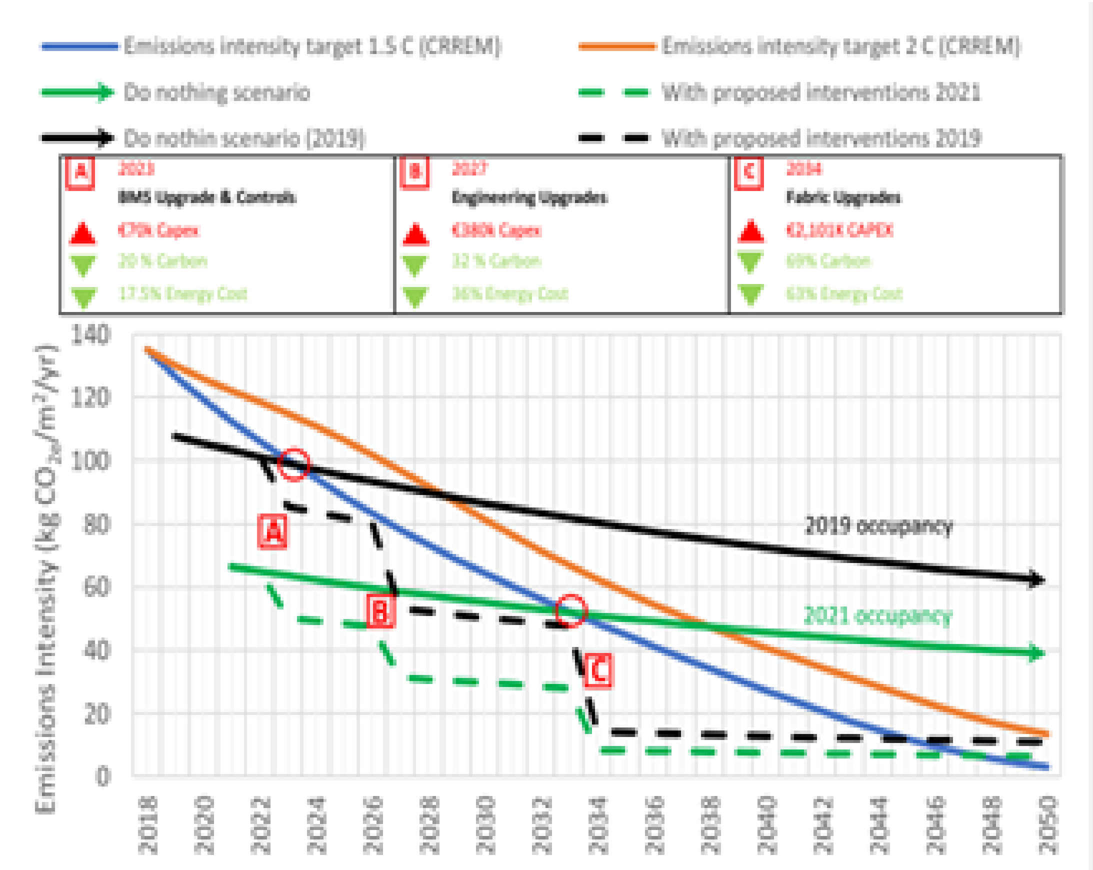

Fig 3: Schedule of Actions for Carbon Neutrality

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3.2 Contract Detail

The contract will initially set out the parties involved. Most contracts will likely be bi-party, i.e. - between ESCO/landlord and ESCO/tenant. The engagement of both landlord and tenants with an ESCO can be achieved by means of a tripartite Energy Performance Contract and an option is included in this respect.

The main aspects of the contract document are the description of works, baseline, the initial estimates of energy/cost savings, the guarantee, final monitoring/verification of savings and the payments to the ESCO.

3.3 Description of works

The agreed works and services and project duration will be described here. This should give overview of the project, capital costs, key participants, project milestones, and other project relevant key performance indicators (KPIs).

The determination of the works may be based on a typical approach as follows: (see Fig. 4):

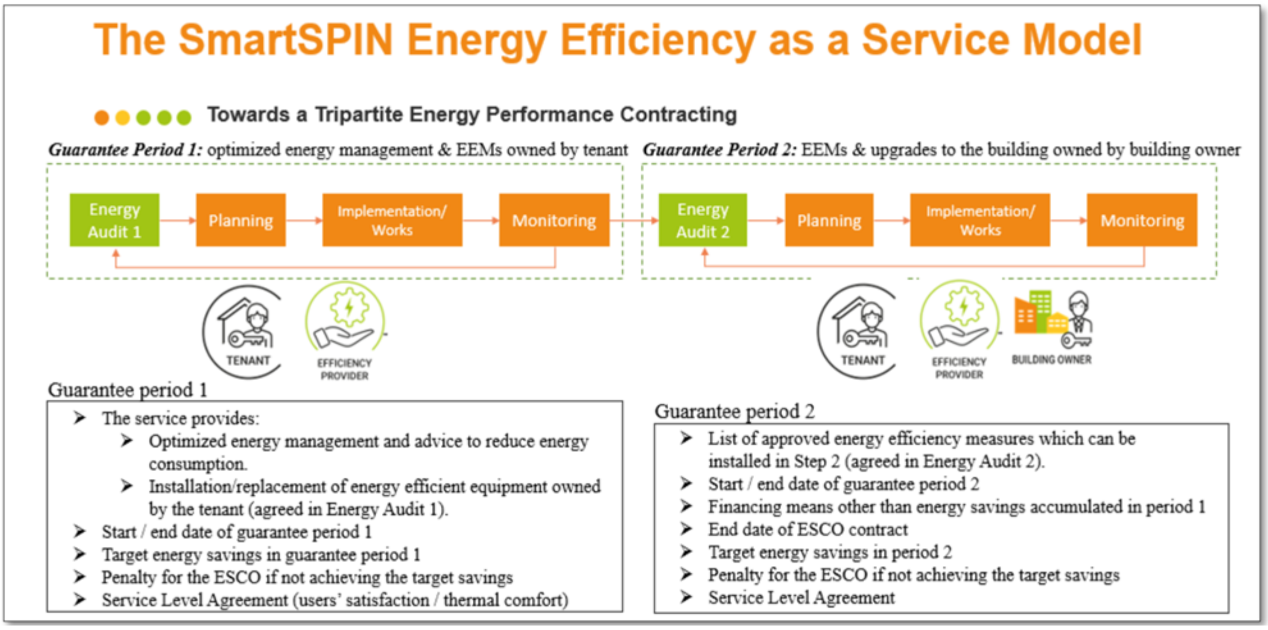

Fig 4: Typical ESCO Stages

- An initial energy audit to be conducted by the ESCO or another party in their name.

- Scope of potential improvement services should be reported and presented to landlord and tenant.

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- The final determination of actions for investment and savings may be by an Investment Grade Audit[1] (IGA).

- The funding arrangements including amounts, drawdown schedules and grants where relevant are determined.

- The introduction of green lease clauses and smart energy management, apportionment of savings between Landlord, Tenant and ESCO.

3.4 Baseline

A building energy baseline is a calculation of the amount of energy used in an existing facility which can be used as a reference tool to compare energy performance before and after a change is made. Establishing a baseline will also help with understanding how energy expenditure contributes to operating costs. To create an energy baseline of a building, energy bills from the previous years are required. A minimum of three years historic data is recommended for accuracy purposes. The occupancy levels will also need to ne noted along with any trends that are relevant. The baseline agreement can be easily revised and agreed periodically based on IoT and AI based tools.

3.5 Energy Cost Savings

The savings will be broken down into energy savings and Demand Side Management (DSM) cost savings. The energy savings will be further elaborated into energy due to building fabric improvement, operational/equipment energy savings and renewable energy type. The calculation of fabric savings can be done using toolboxes set out EPC+[2]. However, modelling tools like IES are highly recommended in terms of accuracy and visual effects. Similarly, the equipment for both energy savings and renewable energy can also be done by the aforementioned toolboxes. The estimate of DSM cost savings which can include reversible chargers, batteries, and demand response control is best done with one of the specialised contractors operating in this domain.

A typical project energy and cost savings and the denomination of the benefit to both landlord and tenant is shown in fig 5. The approximate apportionment of the savings can be based on the metric areas or volumes that are relevant to both. A more comprehensive method of apportioning these savings is shown in section.

[1] An investment grade audit is a very detailed audit that allows to identify specific technologies that could deliver benefits to specific businesses, to determine future scenarios based on investment, to estimate costs, potential energy savings and payback periods as determined from installation of the best energy efficiency measures available.

[2] see https://cordis.europa.eu/project/id/649666/results

	Opportunity	Investment (€)	Energy Savings (kWh)	Energy Cost Savings (€)	Payback (Years)	Carbon Savings (Tonnes CO2)	Opportunity Benefit		
							Landlord Only	Tenant Only	Both
Engineering	Complete LED Transition*								•
	AHU and air quality control of fresh air system								•
	Smart Controls for local TRV and AC units							•	
	BMS Upgrade with energy metering								•
	Solar PV								•
	Bi-Directional Car Charging								•
	Demand Response								•
	Battery Storage								•
	Total Engineering								
Fabric	Hybrid/Passive Ventilation							•	
	Improve Building Fabric and Air Infiltration Performance								•
	Upgrade Building Glazing								•
	Total Fabric								
Certification	Green Building Certification • LEED Certification for Building Design & Construction: New Construction Rating • WELL Certification for WELL Core Rating								•
Overall Total									

Fig 5: Typical Energy and Cost Savings Template

3.6 Performance Guarantee

At the heart of Energy Performance Contracts is a performance guarantee. These are a contractual commitment to achieve a certain minimum level of energy savings through the engineering and/or fabric upgrades and the introduction of renewable technologies and grid services thought an Energy Performance Contract. Transferring this intent to the Smartspin approach requires some additional consideration.

So, where the Step 1 no cost /low cost interventions are made there will be a performance element to this. Small scale upgrade works and controls optimisation or utility bill assessments are used to generate a first tranche of energy, savings and build confidence and relationships before moving to Step 2 and a larger investment.

The contract template will need to consider a number of points around this approach:

- Initially small savings generated for a single party will be targeted, subsequently larger savings by means of a larger investment for multiple parties will be the objective.
- The first step remains relatively straightforward. Step 2 upgrades might want to be advanced before the contract period ends, if step 1 has completed and ESCO's investment is recovered. In other words, step 1 builds the confidence and ambition to progress to larger scale project. However, provision for an early termination of the contract would also need to be determined.
- A Performance Guarantee is a guaranteed insurance for the achievement of adequate performance following an engineering upgrade project (including design,

manufacturing, construction, etc) delivered by an ESCO to Landlord and Tenancies. This needs to be transparent to ensure that both landlord and tenant (sometimes multiple tenants) can easily verify that the performance which is guaranteed is being fulfilled. Some of the key upgrade initiatives - Central heating / cooling centre upgrades, controls replacements & enhancements, lighting & AHU upgrades in addition to renewables energy production & grid services combine to enable a performance guarantee to be made. Also, a distinction between building wide performance (centralised initiatives - central plant upgrade) and floor area based upgrades (Lighting, fabric upgrade etc.) needs to be acknowledged.

- The contract and baselining would need to facilitate a scenario where tenants or landlord may want to carry out subsequent improvements directly. Also changes in baseline energy usage arising across all or some tenancies need to be considered.
- Considering performance guarantees and contract templates it is likely that performance guarantees would be offered and based on overall building performance and to the building management company or owner in most cases. Where tenancies occupy a very large element of the building such as Retail anchor tenant there may be some exceptions.
- Baselining of all spaces both landlord & tenant will be critical for overall performance validation and monitoring including facilitation of demise initiatives outside ESCO contract and usage and environmental condition adjustments in each demise. The savings guarantee will typically mean the ESCO has to achieve the savings, or it is liable to pay if there are any savings underperformance. The determination of the savings threshold is shown in fig 6.

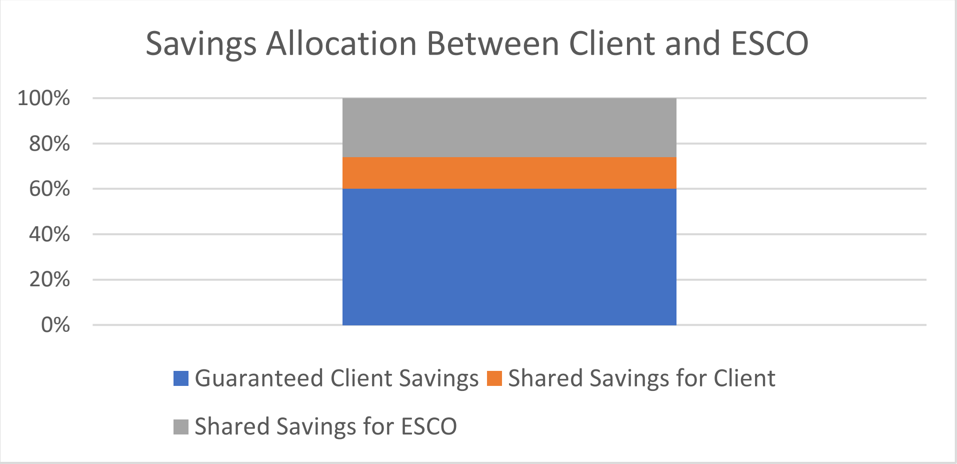

Fig 6: Typical Shared Savings Threshold

- The baseline, overall savings and the threshold should be set out in a typical table such as shown in fig 7 below. The contract does not need to impact on existing facilities management contracts or energy procurement, although it may be beneficial to include maintenance of equipment if required.
- The duration of the savings guarantee will typically last until the project costs have been covered by the savings. There may be variations to this resulting from

individual project aspects such as the financing approach or the services provided (including maintenance and any other ongoing services).

	Electricity Use [kWh/year]	Electricity Cost [kWh/year]	Gas Use [kWh/year]	Other Use [kWh/year]	DSM Savings [€/year]	Other Savings [€/year]
BASELINE						
GUARANTEE						
SHARED SAVINGS THRESHOLD						
TOTAL SAVINGS						

Fig 7: ESCO Savings and Guarantee Threshold

- So, where the Step 1 no-cost/low-cost interventions are made there will be a performance element to this. So small scale upgrade works and controls optimisation or utility bill assessments are used to generate a first tranche of energy, savings and build confidence and relationships before moving to Step 2 and a larger investment.

3.7 Monitoring and Verification

The International Performance Measurement and Verification Protocol[3] (IPMVP) has been developed over many years to provide guidance and expected standards for M&V and covers how variables are dealt with and how adjustments can be made to baselines (e.g., if building occupancy rises or falls). This protocol is used by many ESCO projects as the basis for M&V and it is important that parties understand the proposed M&V approach (and how it will work during the life of the contract), before the relevant contract is signed.

3.8 Service Level Agreement (SLA)/Internal Comfort

This is included as part of the contract rather than a separate agreement. This follows the protocol set out in the outcome-based model with the “chaffauge” model referred to earlier. This can mean that ESCO take over the systems’ operation, the interface between them and the customers could be a Service Level Agreement (SLA) for the outcome of the systems’ operation (for instance, the desirable indoor conditions) and a fee structure for the achievement of this outcome. This provides an incentive for service providers to improve efficiency since as long as the SLA terms are honoured, as increased efficiency means increased margin.

In the particular case here, the SLA is adapted to give a guarantee that the internal conditions, in terms of overall comfort, temperature, controllability will be improved. In many cases this whole process is evolving and will be dependent on the individual clients needs and that the ESCO will offer the full meaning of the SLA with ongoing operation/maintenance service include. Many of the ECMs involved in ESCOs include

[3] https://evo-world.org/en/products-services-mainmenu-en/protocols/ipmvp

control systems that are based on the Iot/smart systems that will provide more accurate outputs and can include not only temperature but also internal air quality to include humidity and CO2 monitoring. The main caveat here for the ESCO is to ensure that the before and after ambient conditions after noted. The energy savings envisaged in the agreement can be seriously affected when the ESCO provides better conditions than hitherto. Every 1 degree C increase in temperature can mean a 10% increase in energy consumption. This potential problem can readily be overcome by the IPMVP report for the before and after conditions.

The minimum performance links to the ESCO requirements within a contract requiring call out response and repair times for service/repair of engineering systems. So, the contracts rather than offering bonuses tend to offer penalties for non-performance. Within contracts KPI's linked to complaints or lack of them would be an effective means of performance measurement.

3.9 Revenue Stream Distribution

Castellazzi[4] in his fine body of work is taken into consideration here. The Energy Efficiency Directive (EED) is the cornerstone of the legal framework for accurate metering and billing of individual consumption of heating/cooling and domestic hot water in multi-apartment and multi-purpose buildings in the EU. The Directive requires the introduction of consumption-based cost allocation as well as an informative billing of heating, cooling and hot water in multi-unit buildings, subject to certain conditions. Individual metering and billing allows sharing the energy costs among the occupants of multiapartment buildings taking into account indicators reflecting their individual, actual energy consumption. It provides occupants with an economic incentive to change behaviour and save energy and hot water, as opposed to situations where energy costs are allocated exclusively according to factors that cannot be influenced by the occupant, such as the floor size, etc.

Where multi-apartment buildings are supplied from district heating or cooling, or where own common heating or cooling systems for such buildings are prevalent, Member States may introduce transparent rules on the allocation of the cost of thermal or hot water consumption in such buildings to ensure transparency and accuracy of accounting for individual consumption. Where appropriate, such rules shall include guidelines on the way to allocate costs for heat and/or hot water that is used as follows:

- Hot water for domestic needs.
- Heat radiated from the building installation and for the purpose of heating the common areas (where staircases and corridors are equipped with radiators).
- For the purpose of heating apartments.

Analysis of Member States' rules for allocating heating, cooling and hot water costs in multiapartment/purpose buildings supplied from collective systems Luca Castellazzi: Implementation of EED Article 9(3) EUR 28630 EN /2017

In reality up to 2017 the application of these rules in individual countries is not consistent with many having no rules including Ireland, Spain and Greece. The rules set out in Germany and Hungary are considered noteworthy for trial purposes on this project.

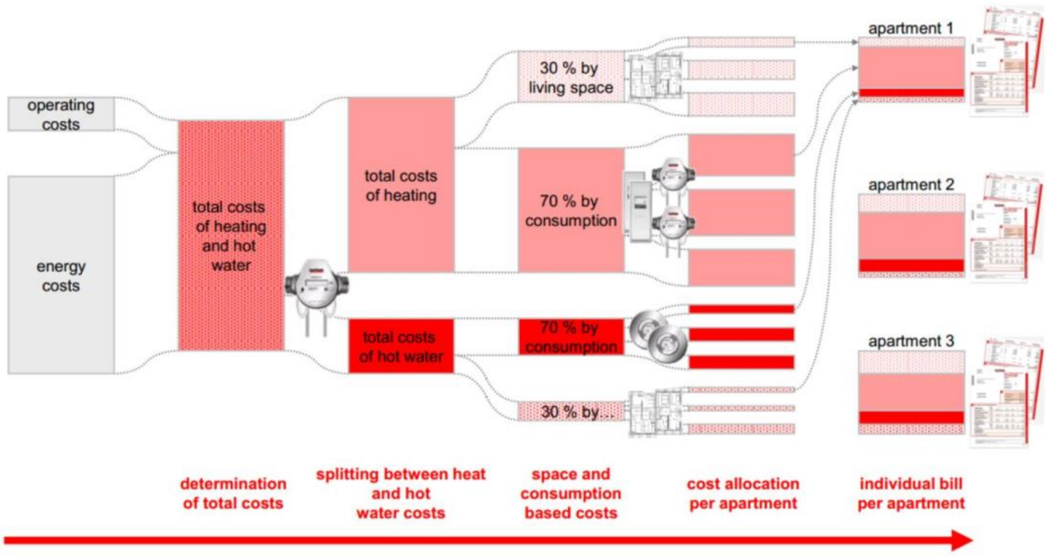

Fig 8: Allocation energy costs Germany

The German situation is shown in the above Sankey diagram and is based on the 70/30% rule for space heating hot water with common areas then added in proportion to habitable area. Although the building type is residential the concept could equally be applied to the commercial landscape where landlord footprint predominantly represents circulation areas and shared service areas – toilets, showers, entrance / reception areas.

The Hungarian rules go one step further and are mainly applied for district heating systems. The cost allocation is directly managed by the condominium owners assembly; when heatcost allocators are installed, at least 30% but maximum 50% of the consumed heat
quantity shall be divided between the units on the basis of the volume of the unit, the remaining quantity shall be divided based on the information provided by heat cost allocators, taking also into account room orientation correction factors. Within the contracts dealing with how revenue streams are split will be very much a case-by-case basis. Tenancies can be quite diverse in their nature and there is clear distinction between those where the landlord is present and occupies part of the building, and those where this is not the case.

So, where the landlord is not present, then all benefits in terms of investment creating energy and carbon reduction will only accrue to the tenants. Tenants could make individual or aggregated contracts with an ESCO and benefit from the shared savings through a performance-based contract. Alternatively, the Landlord could contract with an ESCO and the performance sharing then happen through the savings created being collected by the landlord in terms of reduced tenant costs and passed through to the ESCO.

A split of revenue streams will only appear attractive for a tenant if any reduction in their operational costs exceeds the charge a landlord might levy for improvements. Some exceptions might arise where a tenant sees non-monetary value in the form of improvement in the sustainability credentials or environmental conditions of the building that they occupy.

This situation will be similar where the landlord also occupies part of the building. The only difference here would be the apportionment of payments to an ESCO versus operational savings for that Landlord occupied footprint would reduce tenants' overall contribution on a pro-rata basis.

The apportionment of revenues should be made through measurement using IMVP and its allocation of revenues to the relevant parties. Included within the SmartSPIN project is an ability to assess, measure and apportion in real time the relative economic benefits of energy savings, grid services and on-site renewable technologies across multiple tenancies and landlord demise. This is very important to the successful savings validation and also to introduce gamification across multiple tenancies within a building.

As the issue of asset depreciation becomes more prevalent in the market then the question of investment in tenancies solely being considered as tenant benefits is likely to change and to be seen as a shared benefit – operational revenue and asset protection as value metrics.

3.10 Data Protection

In terms of Big Data and Security Management there are two key issues. The first is harvesting of energy usage and other performance data from a site and how this is achieved. For many buildings, there is a reluctance to integrate into the IT systems of the building. For instance, retail, banking, data storage providers and many more see the operational and security risk of taking building data back through building data cabling to centralised comms data racks as adding an unacceptable amount of risk both from an accidental operational disruption perspective and more importantly the introduction of a cyber risk through the building monitoring devices and gateways.

The second element of this is the data itself, and the sensitivity that can often exist around sharing are leaking of energy/carbon /or other environmental metrics from a building or portfolio which could be commercially or from a compliance perspective sensitive.

The whole process of formulation and ongoing operation of the ESCO is based on considerable access to considerable amounts of data. There is the collection of the historic data to formulate the baselines. This can be facilitated by central access to meter registration offices like the MRSO[5] in Ireland. This office will provide electricity and gas

[5] Meter Registration System Operator, http://www.mrso.ie/about_mrso/index.htm

consumption data for any customer in Ireland to third parties once you have the MPRN[6] number for the account and the written permission of the account holder. You also must accept to use an encryption software like Axcrypt[7]. This ensures that the customer data is protected from any unwanted interventions during the transfer process. Also, in all European countries you have to comply with the rules set out in the General Data Protection Regulation (GDPR).

The ongoing operation of the ESCO also relies on monitoring, control systems that are continually interfacing with and storing data on cloud platforms. These include:

- Measurements from the distributed devices, including data that is derived from those measurements
- Internal states and configurations of the distributed devices
- Data that you enter in the Apps or the Web Dashboards
- Account data and user credentials
- Network control data

You should ensure that all relevant in-house and customer wi-fi systems are secure. You should also check that the companies supplying and storing data on behalf of the customer have the best protection available to ensure there is no breach which would impair or compromise the customer's data.

3.11 Dispute Resolution

Standard dispute resolution clauses could still be used however in the resolution process the more complex landscape needs to be considered where three parties exist to the agreement. This can add an additional complexity where perhaps one party of the two initiate dispute proceedings there has to be a contractual mechanism to deal with this.

Obviously dispute resolution covers a wide spectrum of situations – ESCO performance issues, payment issues to ESCO, maintenance & repair issues on sties. Current dispute resolution clauses are quite general and describe a process and are likely to require only minor modification for SmartSPIN concept adoption.

3.12 Miscellaneous Contract Template Notes

The template shown in Appendix is based on a practical example in the process of being implemented. The actual project is based on a large leisure facility in Ireland consisting of main building or owner and a number of independent houses on the same site. The actual contract in operation is actually a bi-partite type between the ESCO and the facility owner. The template is modified here to show a tri-partite option with an additional Client (Client 2 – Tenant) added into the contract. This means that savings would need to be

[6] Meter Point Reference Number (MPRN) is the unique 11 digit number assigned to your electricity connection and meter, https://www.esbnetworks.ie/existing-connections/meters-and-readings/how-to-find-your-mprn

[7] https://axcrypt.net/

apportioned between the parties concerned. The actual energy conservation measures (ECMs) involve heat pumps, back of house lighting controls/ventilation, pump replacement, PV installation, wireless temperature regulating valves and a monitoring system. These would be typical ECMs relevant to projects with heating systems in Northern Europe. In Southern Europe it is likely that projects will be measures to reduce cooling energy costs and thus have an emphasis on measures around building shading, "brise soleil" and AC upgrading. It must also be noted with ongoing climate change that these measures are now becoming more relevant in Northern Europe.

In reality it is likely that most contracts like this will be a bi-partite type for the foreseeable future. A tri-partite contract would require that individual owners would need to be grouped into a legal entity or trust with independent funding which was not the case in this particular case.

A possible way forward - is that if there is existing lease is in place - it may be more appropriate to post a 'Memorandum of Understanding' (MOU) alongside the existing lease. Some key changes that are advocated and introduced to Green Leases would be the following:

- Require tenants to purchase on-site renewables if offered and competitively priced.
- Inclusion of cost recovery clause where investment benefits tenant.
- Tenants to cooperate and assist landlord where deep retrofit works are being undertaken and landlord to equally minimise disruption.
- Cooperation through regular meeting form between landlord and tenant.
- Information sharing across energy, water and waste between landlord and tenant.
- Require minimum energy efficiency fit-out out by tenants.
- Align sustainability credentialing.
- Establishing and setting ambition regarding key sustainability, KPI8. Disclose whole building annual performance to tenants.
- Encouraging single Facilities Management provider11 To allow the free flow of information between landlord / tenant and at upgrade stage access to both landlord and tenant areas where equipment is to be installed and commissioned also it is important that contractual agreements facilitate this.
- Where unavoidable operational disruption arises at project implementation or within the service life then the contract template should facilitate the required conditions.
- Consideration of costs of landlord and tenants providing access and in some instances security cover needs to be considered within contract templates for the works phase and service life.

4. FLEXIBLE-DYNAMIC TARIFF DESIGN

4.1 Methodological approach

EUNICE, in the context of Subtask B developed electricity tariffs with fully dynamic charges based on Greek Electricity Market SMPs as an input vector and conducted a seasonal analysis for a typical day of each season throughout a year in order to showcase the load shifting and monetary savings potential due to the application of the dynamic tariffs in the Greek Demo Site.

For the development of the flexible/dynamic electricity tariffs the required as an input hourly System Marginal Price (SMP) data were provided from the Hellenic Energy Exchange Market and the authorised DSO for the time period from November 2020 to March 2023. Based on the literature, SMPs can efficiently reflect the environmental costs of energy production and sufficiently used as a price signal to quantify monetary saving potentials.

It has to be noted, that in the context of the analysis it was assumed that the shifts in electricity consumption would not be that high enough in order to alter the SMPs, used as input vectors for the design of the flexible/dynamic tariff. Moreover, potential price adjustments across years, which could occur if consumers' aggregated annual financial savings exceed the system-wide cost reductions or if these are unevenly distributed were neglected.

The load profile is based on real-time consumption data, in minute granularity, derived from each tenant as well as for the whole IG4 building. The electricity consumption data were retrieved based on the historical data measurements of the smart meters installed within the Greek demo site and were available for a time period from August 2022 to March 2023. Electricity consumption data were post-processed to hourly granularity in order to facilitate the analysis. For the comparison of the energy cost based on the flat rate pricing, real fixed tariff data from the monthly electricity bills of the I4G office building in Thessaloniki, Greece, were utilized. The seasonal analysis was conducted for a typical day in hourly increments for the following months also based on data availability: August 2022, November 2022, January 2023 and March 2023. To evaluate the overall cost savings of a household that shifts its electricity consumption in response to price signals, we compare the corresponding hourly electricity costs with the costs that would accrue if the household used a simple flat (reference) tariff.

4.2 General outcomes

Based on the SMP data available from the Hellenic Energy Exchange market and the data related to the flat rate tariff applied in the monthly electricity bills of the Greek Demo site, we can have a first preliminary comparison of the cost saving potentials from the application of dynamic tariffs based on the SMPs. The results for each month of years 2022 and 2023 are presented in Figure 9 and Figure 10 respectively.

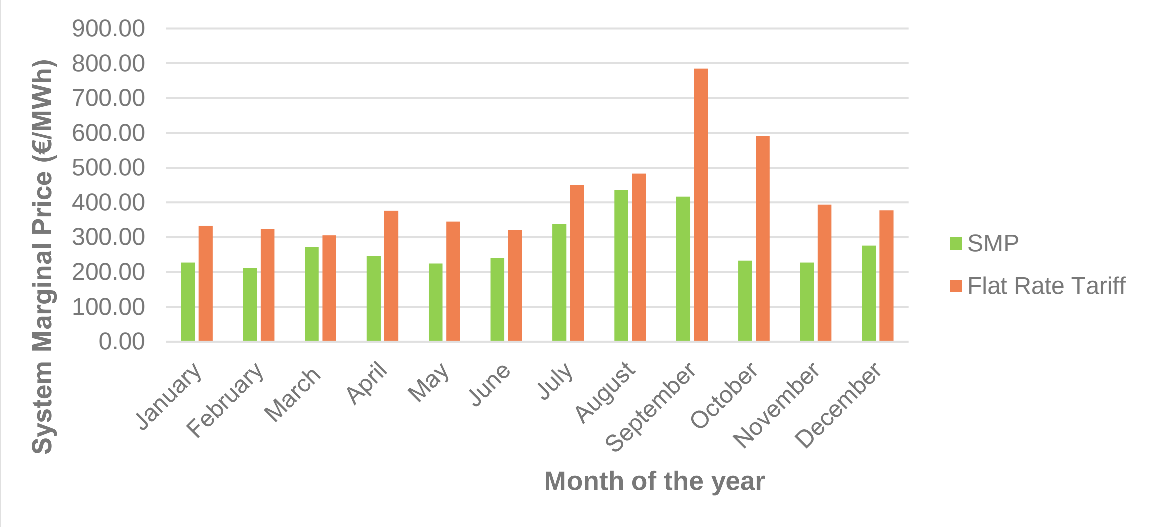

Figure 9 : SMP and Flat Rate Tariff, Year 2022.

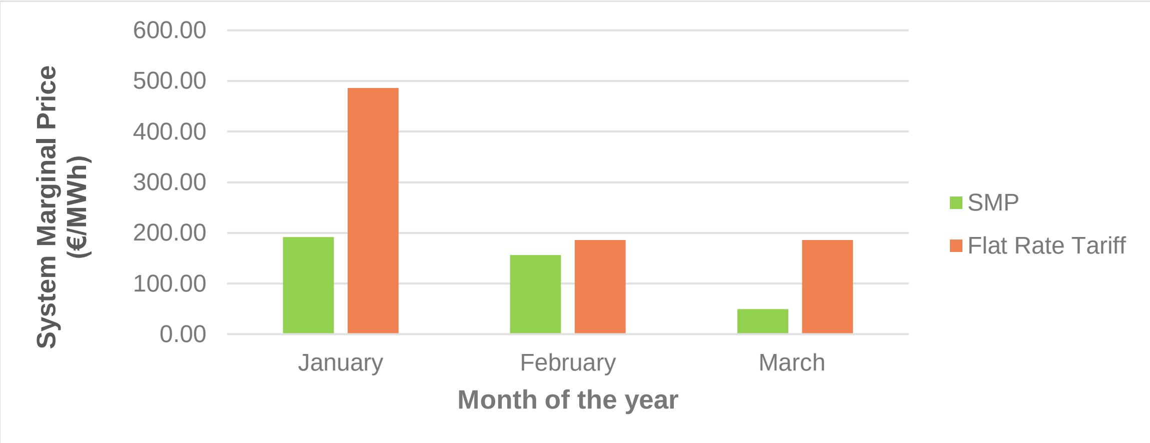

Figure 10: SMP and Flat Rate Tariff, Year 2023.

From the above Figures, we can conclude that there is a significant deviation between Flat Rate Tariffs and System Marginal Prices for both years. The largest deviations seem to occur in September 2022 and January 2023, as after September 2022 based on a New Greek law the readjustment clause was integrated in the flat rate tariff within the monthly electricity bills. Overall, results indicate that the electricity pricing from energy utility companies and/or energy providers is not fair and transparent for the consumer, as it does not represent the actual cost based on his energy consumption profile. It can also be demonstrated that SMPs as well as flat rate tariffs had an increasing trend from January 2022 until August 2023, which can be explained by the high natural gas wholesale prices within this period due to the energy crisis and the Russian invasion in Ukraine. The above heavily impacted wholesale electricity prices, as based on the Greek energy mix, electricity production is heavily dependent on natural gas (averagely by 40%).

In order to have better insights on the hours within the day that the load shifting of energy consumption would be of value for the consumers and significant cost savings can be generated, the SMPs were plotted for every hour of a typical day for the months investigated in the context of the analysis.

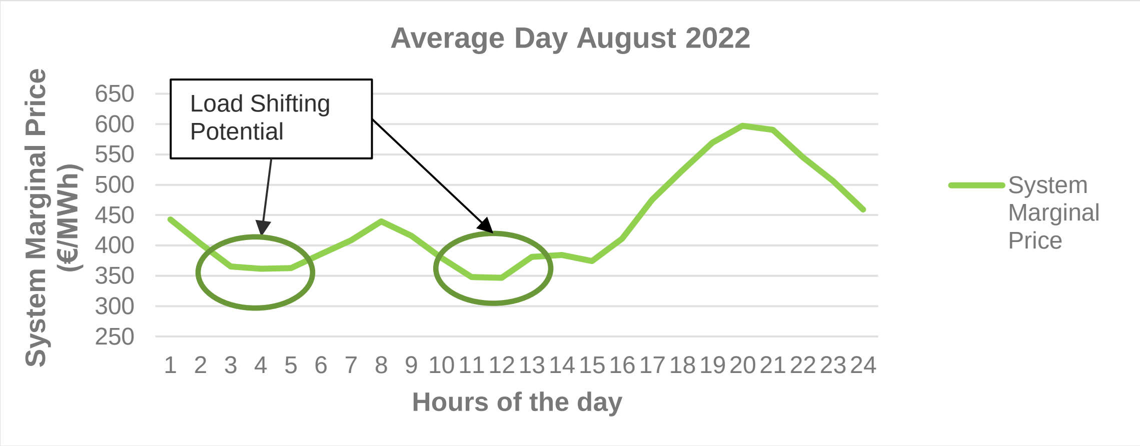

Figure 11: SMP Greek Electricity Market-August 2022

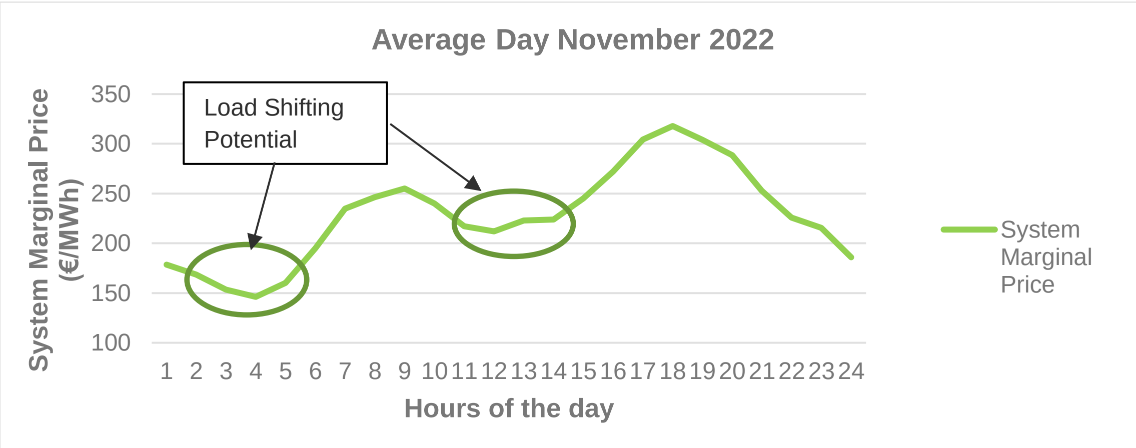

Figure 12 : SMP Greek Electricity Market-November 2022

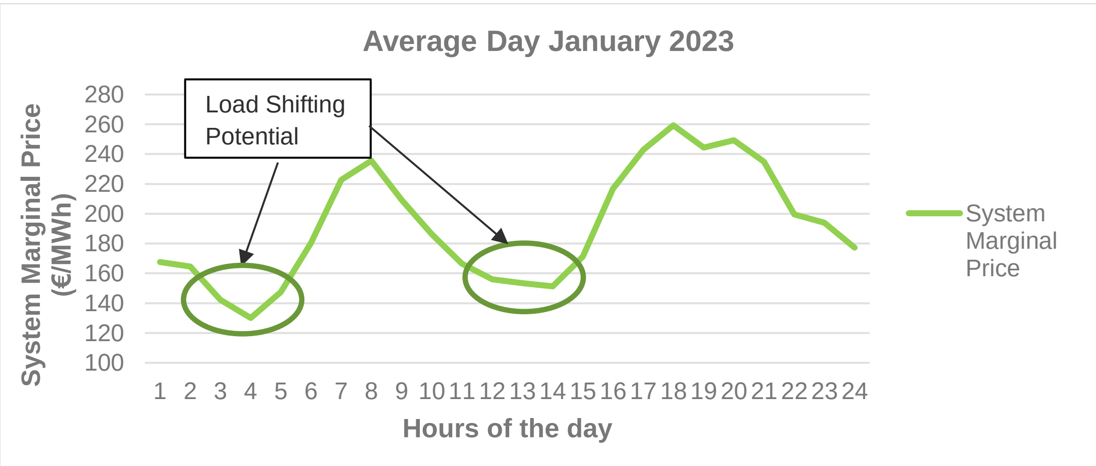

Figure 13: SMP Greek Electricity Market-January 2023

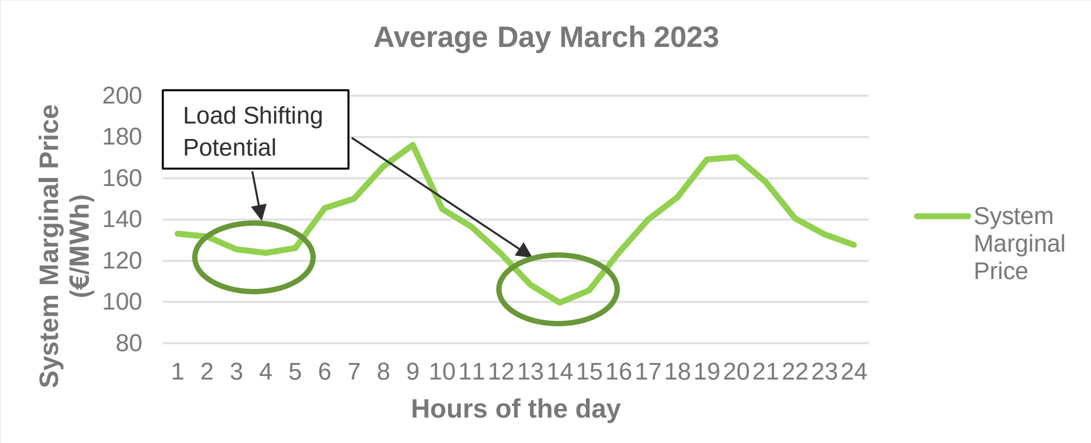

Figure 14: SMP Greek Electricity Market- March 2023.

A similar trend can be observed for all the above figures. The lowest System Marginal Prices occur between 2:00-5:00 and then between 11:00-15:00, where the RES share in the energy mix is high (high wind energy production at night hours and high solar energy production at the middle of the day). The above indicates that customers could shift their energy consumption within these low-price hours of the day in order to get remunerated via a demand response program and flexible tariffs. The price fluctuations within the timespan in which electricity consumption can conveniently be shifted are decisive in creating possible cost savings. In order for the financial savings to increase the average short time spread of SMPs must be increased.

In our specific case study the load profile of an office building is not so flexible, as companies usually operate between 9:00-17:00 pm, so one recommendation for the customers would be, either to cool or heat their space in advance, thus shifting their electricity consumption during night hours via the installation of automation and smart monitoring systems or shift their load to the middle of the day in hours between 11:00-15:00 am.

4.3 Energy cost saving potential and seasonal analysis

The cost savings potential per month for a full year between April 2022 and March 2023 were evaluated, by applying the dynamic tariffs developed in the load profile of I4G Office Building and comparing the results to the energy cost based on the existing pricing method with a fixed flat tariff. The results related to the above analysis are presented in Figure 15.

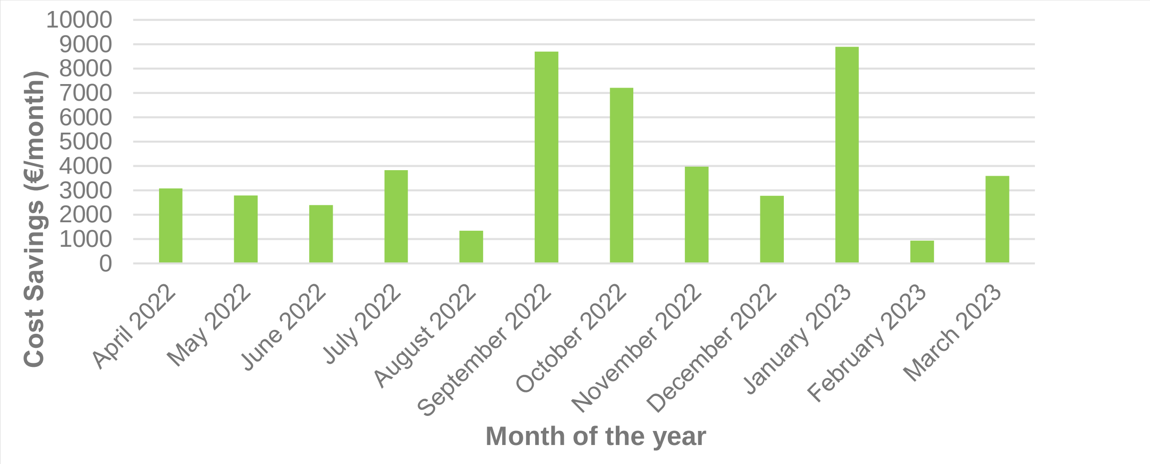

Figure 15: Cost Saving Potential of I4G Building, April 2022-March 2023.

Based on the results, it can be claimed that the application of the dynamic tariff structure based on SMPs can generate significant cost savings for the office building ranging from 930 €/month to up to 8.896 €/month. The highest cost saving potential can be observed within the months of the year that the largest difference between the SMP and the flat rate tariff occurs. Therefore, dynamic tariff application and load shifting through demand response schemes could be a promising approach for a typical office building.

In order to have more insights of the analysis in hourly intervals, the dynamic tariff structure, based on the SMP for each hour of a typical day of selected months, were applied to the model in order to illustrate the benefits from dynamic tariff pricing. The results are presented in Figure 16-Figure 23. The light grey bars show the average total daily electricity consumption of the building. The solid black line shows the electricity cost disaggregated in each hour of the day based on the fixed flat tariff and the solid green line shows the electricity cost calculated based on the application of the dynamic tariff.

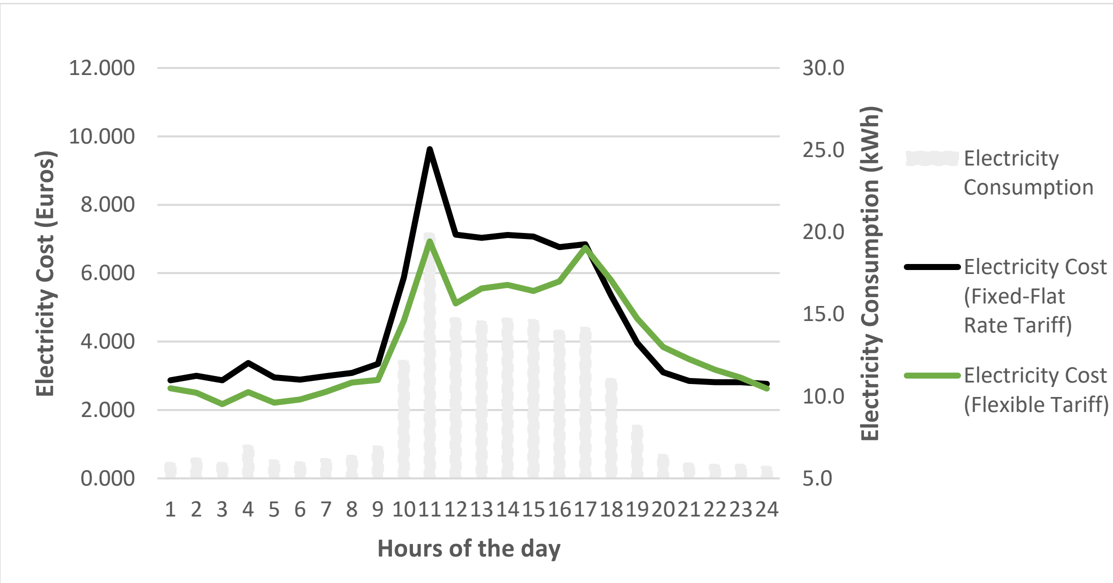

Figure 16: I4G Office Building-Total Electricity Cost and Consumption for a typical day, August 2022.

For a typical day of August 2022, it can be derived that the electricity cost based on the application of the dynamic tariff approach is for most of the day lower than the electricity cost based on the fixed flat tariff. Higher electricity cost based on the flexible/dynamic tariff only occurs between 18:00-23:00. This can be attributed to the increased load in the Greek energy system within these hours during a summer day, subsequently also leading to higher SMPs. Similar trends can also be observed at tenant level. Indicative results for one of the tenants of the I4G Office Building are presented in Figure 17.

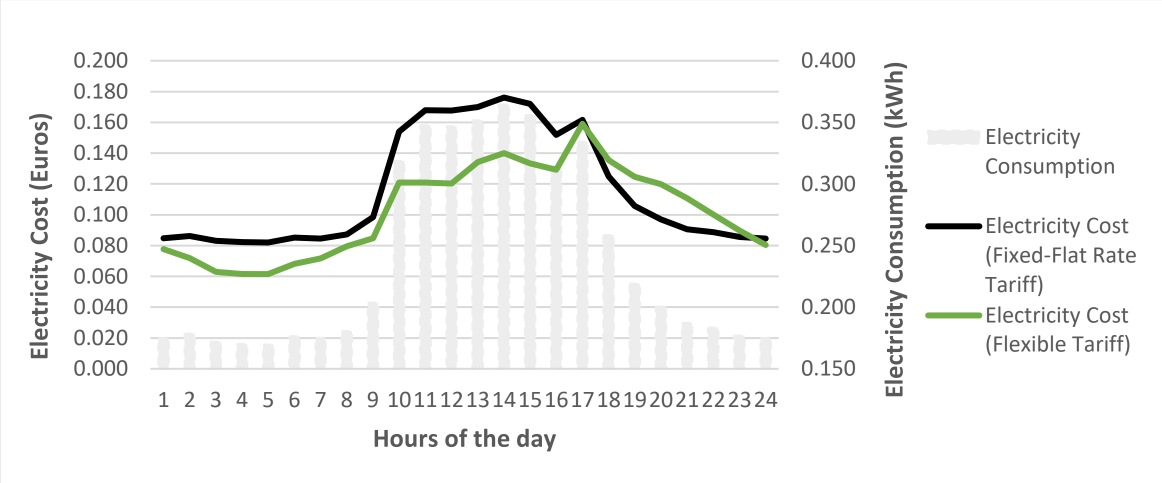

Figure 17: I4G Office Building-Tenant 3 Electricity Cost and Consumption for a typical day, August 2022

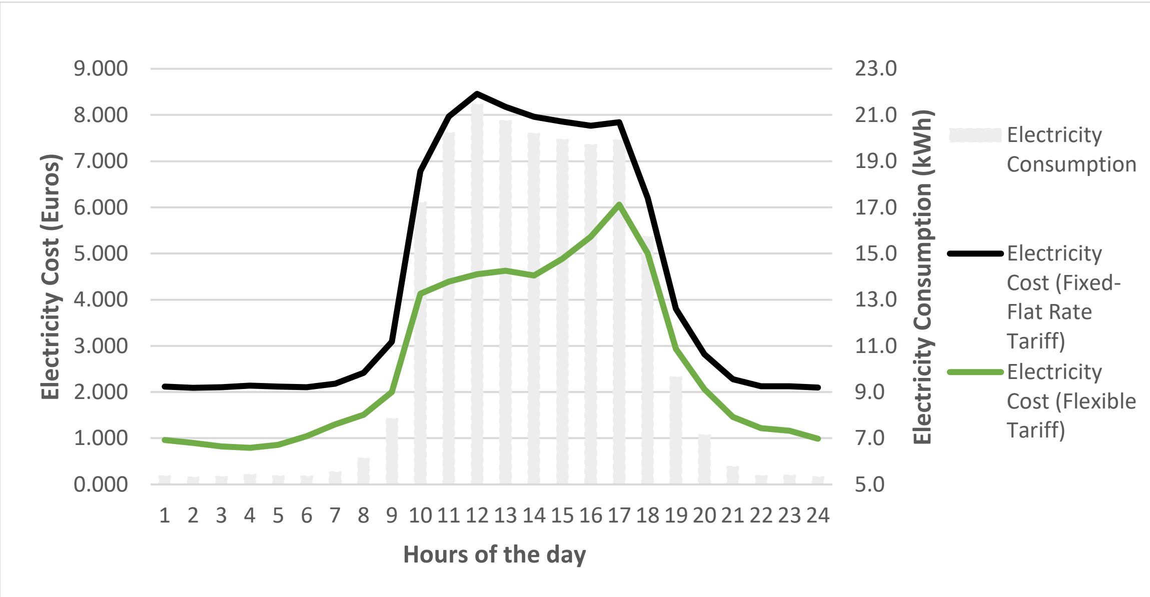

Figure 18: I4G Office Building- Total Electricity Cost and Consumption for a typical day, November 2022.

For a typical day of November 2022, it can be derived that the electricity cost based on the application of the dynamic tariff approach is lower than the electricity cost based on the fixed flat tariff for all hours of the day. Especially during the middle of the day, where the RES penetration in the energy mix is higher due to the solar energy production, we observe the highest differences between the two tariff approaches. The above results indicate that for an office building usually operating between 9:00-17:00 pm, significant cost savings could occur through dynamic tariff pricing. Similar trends can also be observed at tenant level. Indicative results for one of the tenants of the I4G Office Building are presented in Figure 19.

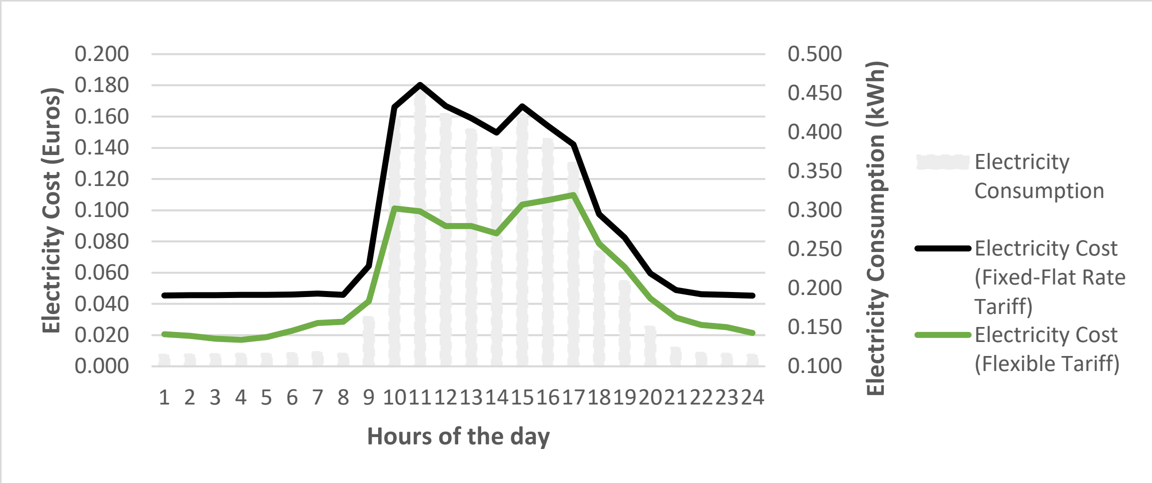

Figure 19: I4G Office Building- Tenant 3 Electricity Cost and Consumption for a typical day, November 2022.

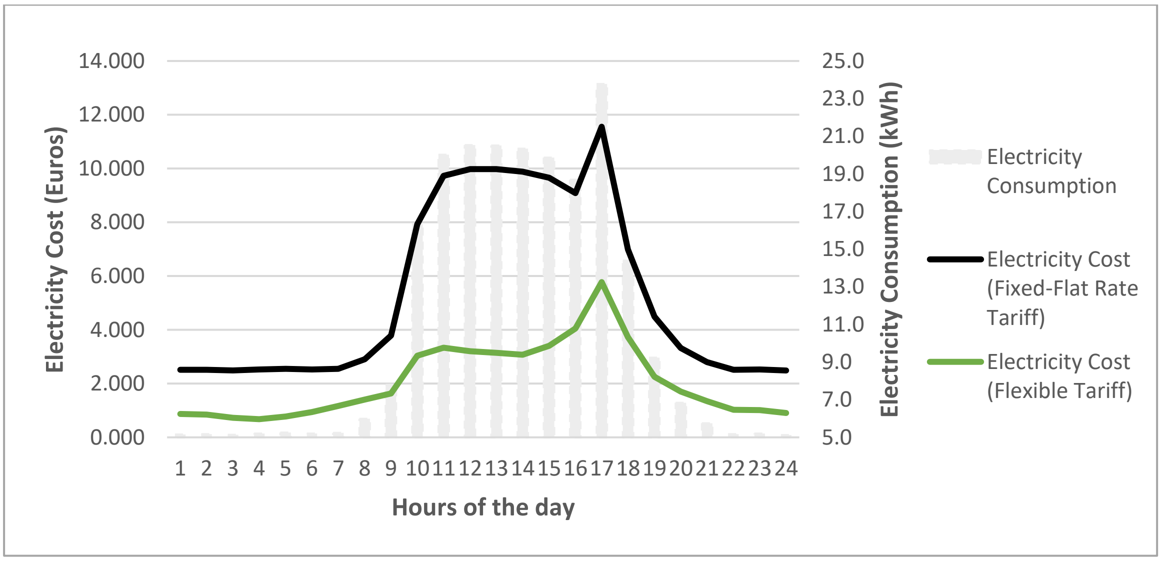

Figure 20: I4G Office Building-Total Electricity Cost and Consumption for a typical day, January 2023.

For a typical day of January 2023, it can be derived that the electricity cost based on the application of the dynamic tariff approach is much lower than the electricity cost based on the fixed flat tariff for all hours of the day. Especially during the middle of the day, where the RES penetration in the energy mix is higher due to the solar energy production, we observe the highest differences between the two tariff approaches. The large difference in the electricity cost calculated based on the different tariff approaches can be also attributed to the low SMP reported prices during January 2023. Similar trends can also be observed at tenant level. Indicative results for one of the tenants of the I4G Office Building are presented in Figure 21.

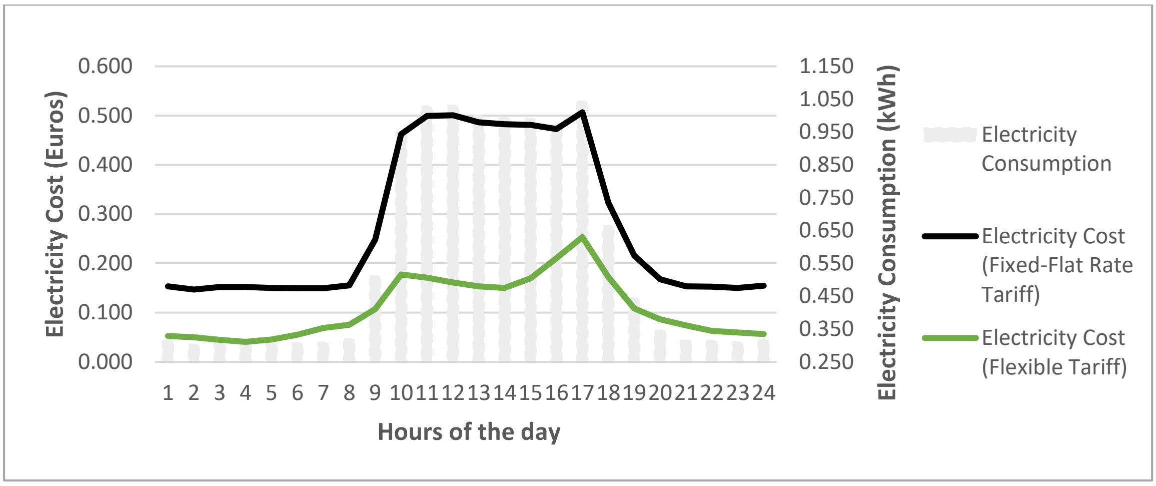

Figure 21: I4G Office Building-Tenant 10 Electricity Cost and Consumption for a typical day, January 2023.

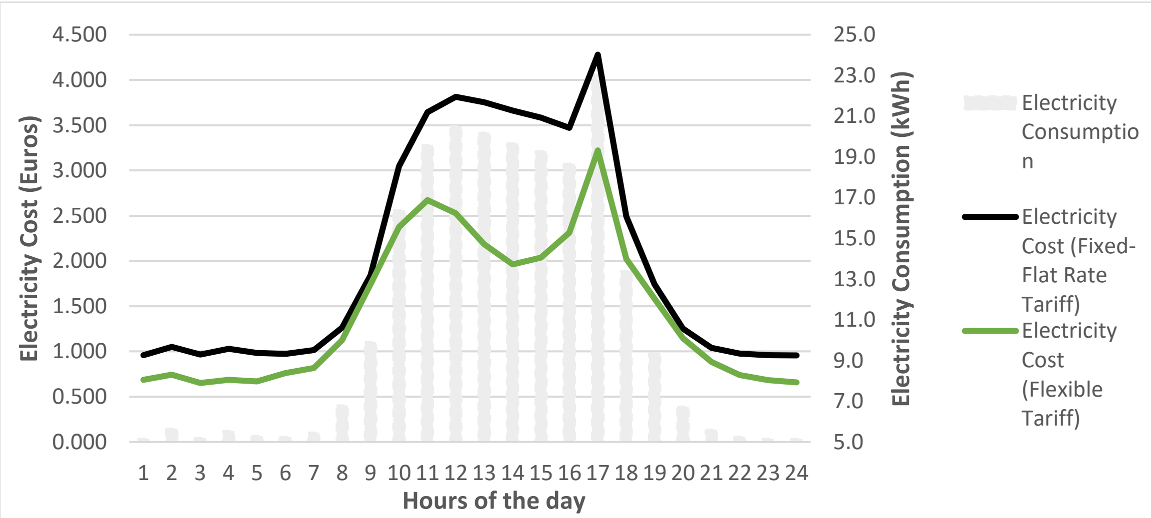

Figure 22: I4G Office Building-Total Building Electricity Cost and Consumption for a typical day, March 2023.

For a typical day of March 2023, it can be derived that the electricity cost based on the application of the dynamic tariff approach is lower than the electricity cost based on the fixed flat tariff for all hours of the day. Especially during the middle of the day, where the RES penetration in the energy mix is higher due to the solar energy production, we observe the highest differences between the two tariff approaches. Nevertheless, during early morning hours (between 8:00-9:00) and afternoon hours (19:00-20:00), the electricity cost based on the different tariff approaches is almost equal. Similar trends can also be observed at tenant level. Indicative results for one of the tenants of the I4G Office Building are presented in Figure 23.

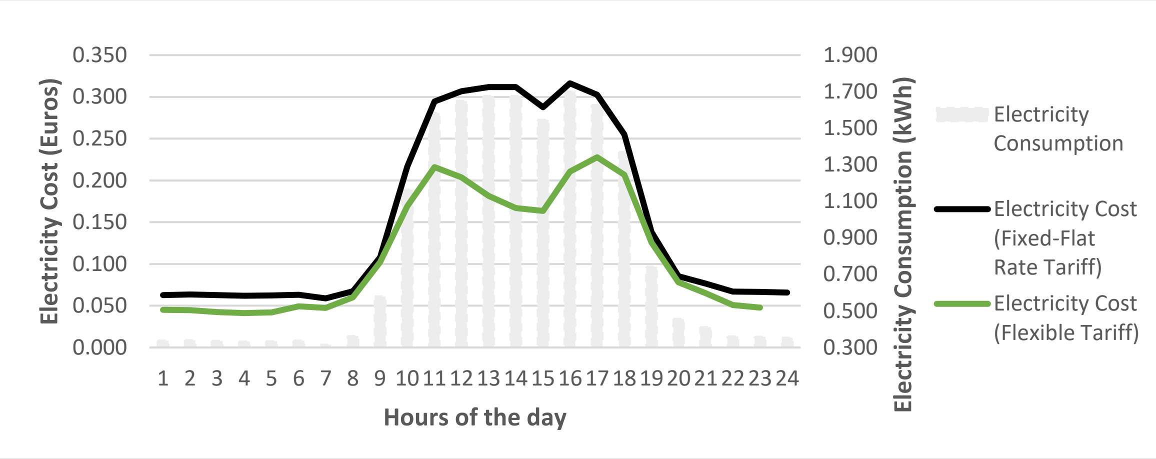

Figure 23: I4G Office Building-Tenant 6 Building Electricity Cost and Consumption for a typical day, March 2023

4.4 SENSITIVITY ANALYSIS- ENERGY PROVIDER MARGINAL PROFIT

In order to quantify the potential marginal profit, via the implementation of the dynamic tariff structure developed, from the perspective of an energy provider, a sensitivity analysis was conducted for three different marginal profi0t scenarios, 10%, 30% and 50%. The marginal profit was attributed on the electricity cost of the consumer as derived from the implementation of the dynamic/flexible tariff. The results of the sensitivity analysis for the selected months are presented in Figure 24-Figure 27. The solid black line shows the electricity cost calculated based on the fixed flat rate tariff, the solid green line shows the electricity cost calculated based on the dynamic tariff structure without any marginal profit from the energy provided, the dotted green line shows the electricity cost based on dynamic tariff with marginal profit of 10%, the dashed green line shows the electricity cost based on dynamic tariff with marginal profit of 30% and the dotted and dashed green line shows the electricity cost based on dynamic tariff with marginal profit of 50%.

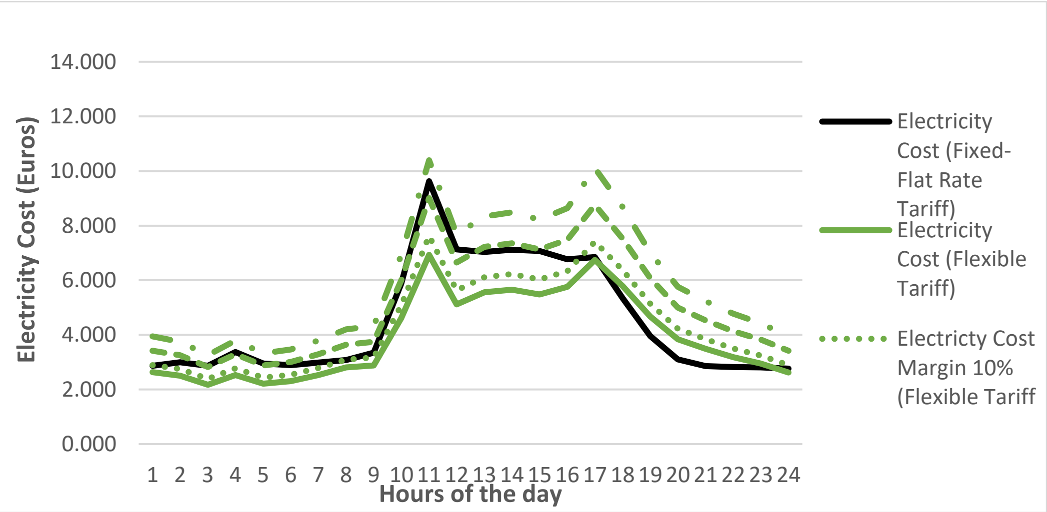

Figure 24: Sensitivity Analysis-Electricity Cost for various Marginal Profits for a typical day, August 2022.

From the sensitivity analysis for August 2022, it can be claimed that a marginal profit for the energy provider implementing a dynamic tariff pricing to a commercial customer greater than 30%, with a subsequent increase by 30% or greater of the dynamic tariff applied, would lead to higher electricity costs for the customer compared to the ones calculated for the fixed flat tariff almost within all the hours of day and especially during 15:00-24:00. The only acceptable marginal profit level for the energy provider based on the analysis, would be a percentage of 10%, that would marginally lead to lower electricity cost compared to the one based on the flat tariff for some hours within the day (between 1:00-17:00).

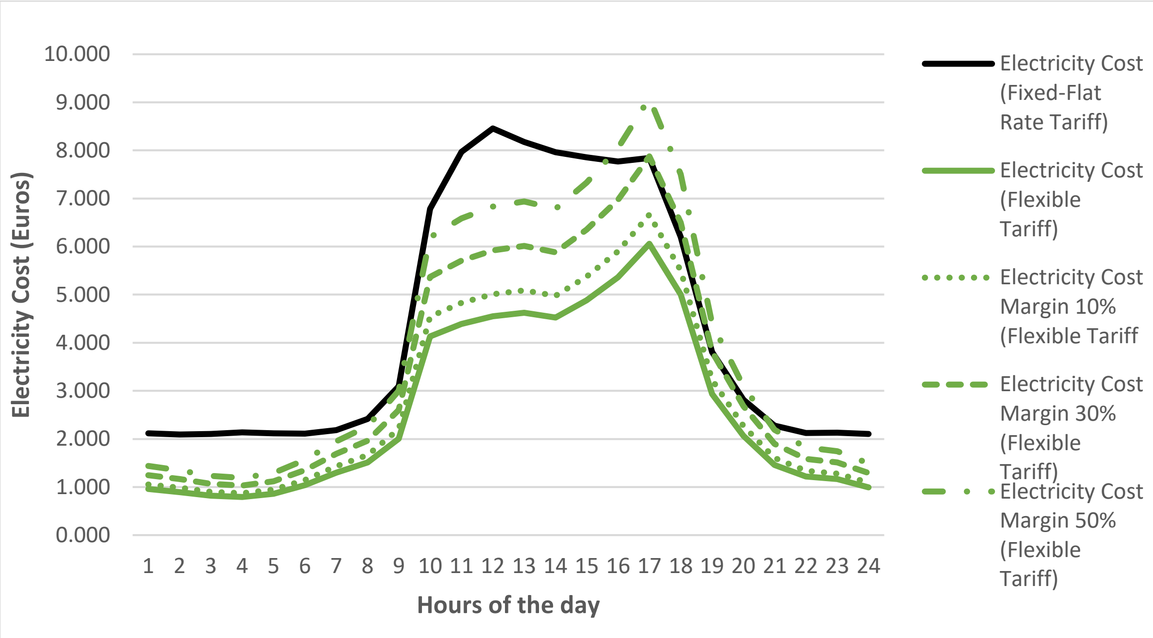

Figure 25: Sensitivity Analysis-Electricity Cost for various Marginal Profits for a typical day, November 2022.

From the sensitivity analysis for November 2022, it can be claimed that for an energy provider implementing a dynamic tariff pricing to a commercial customer, a marginal profit percentage of 30% or lower, with a subsequent increase by 30% or lower of the dynamic tariff applied, would be acceptable in terms of customer cost as it leads to lower electricity costs compared to the ones calculated for the fixed flat tariff within all the hours of day. For a marginal profit of 50%, the customer electricity cost will be higher that the reference cost (based on fixed flat tariff) between 16:00-21:00 within a typical day of November 2022. This can be attributed to the increased SMPs during these hours of the day due to higher load and lower RES share in the electricity generation mix.

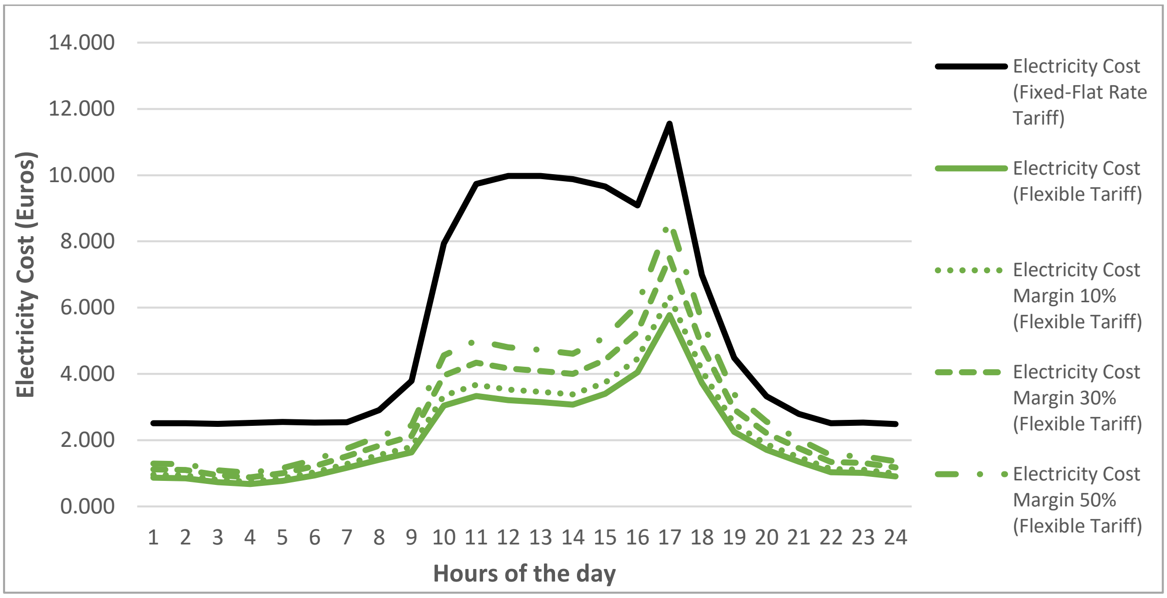

Figure 26: Sensitivity Analysis-Electricity Cost for various Marginal Profits for a typical day, January 2023.

From the sensitivity analysis for January 2023, it can be claimed that for an energy provider implementing a dynamic tariff pricing to a commercial customer, even a marginal profit percentage of 50%, with a subsequent increase by 50% of the dynamic tariff applied, would be acceptable in terms of customer cost as it leads to lower electricity costs compared to the ones calculated for the fixed flat tariff within all the hours of day.

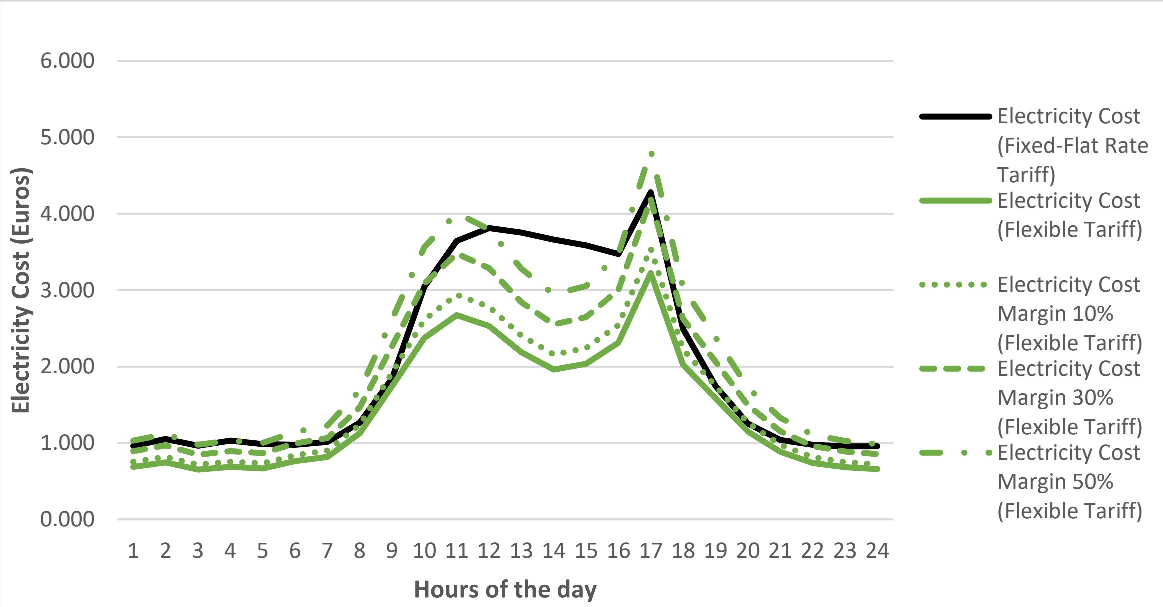

Figure 27: Sensitivity Analysis-Electricity Cost for various Marginal Profits for a typical day, March 2023.

From the sensitivity analysis for March 2023, it can be claimed that for an energy provider implementing a dynamic tariff pricing to a commercial customer, only a marginal profit percentage of 10% or lower, with a subsequent increase by 10% or lower of the dynamic tariff applied, would be acceptable in terms of customer cost as it leads to lower electricity costs compared to the ones calculated for the fixed flat tariff within all the hours of day. For a marginal profit of 30%, the customer electricity cost will be higher that the reference cost (based on fixed flat tariff) between 7:00-10:00 and 18:00-22:00 within a typical day of November 2022. Within these hour intervals, SMPs are relatively high as a) the RES share in the energy mix is lower compared to the RES penetration in middle of the day and b) load is also higher. For a marginal profit of 50% a same trend occurs, however extended hour intervals can be observed, in which the customer electricity cost is higher that the reference cost (based on fixed flat tariff)

In general, from the sensitivity analysis for the selected months it can be stated that both customers and energy providers could find a significant incentive for investing on smart energy solution systems in order from the one side, customers, to participate in load shifting and demand response programmes and from the other side, energy providers, to implement dynamic tariff pricing respectively. In most of the cases marginal profits and subsequent increases in dynamic tariff pricing of up to 10% are acceptable and does not lead to higher costs for the consumer compared to the reference scenario. Another option from the perspective of the energy provider would be to apply different dynamic tariffs, with higher prices within specific hours of the day (in the middle of the day) and/or months and lower prices or even dynamic tariffs equal to the existing flat rate for time intervals where the SMPs are higher than the fixed flat rate tariff, provided that customer costs are not increasing compared to the reference scenario.

As a conclusion from the analysis, it can be claimed that time-invariant unit charges involve many disadvantages. These include economically inefficient prices, the inability to mitigate cross-subsidies across customers, and the lacking incentive for customers to participate in demand-side management. Building on the premises that residential uptake of dynamic pricing is augmenting energy efficiency, overcoming households' adoption barriers is a fundamental requirement to realizing the many benefits associated with dynamic electricity tariffs. To this end, it is crucial to dynamize all consumption-based unit charges and explore the tariff requirements that are necessary in order for households to achieve positive net savings.

APPENDIX 1: CONTRACT TEMPLATE

There are already contract templates that have been developed to provide contractual framework between the ESCO and a project beneficiary / recipient. As the model has been substantially promoted in the Public Sector in EU member states the contract templates that exist tend to be drawn up on behalf of a recipient and tend to protect and bias therefore the recipient in its drafting. Also, it is important to note that the contracts that exist have substantially been designed for a two-party agreement without the complexity of shared beneficiaries that arise in the landlord / tenant scenario.

Our approach has been to use an EU Template that was revised for the Irish market by SEAI (Sustainable Energy Authority Ireland) for use in Public Sector contracts. The contract for use in the Private Sector and also split incentive landscape is likely to require further adaption. This additional landscape also encompasses suggested changes to existing landlord / tenant agreements in the form of Green Leases and additional sustainability-based MoU's which will promote landlord tenant engagement and elements of these will be reflected in contractual templates – savings sharing, metering installation & monitoring, facilitation of upgrade works etc.

We have attempted within this task to offer key guidance in terms of the required adjustments however it is likely that individual Member State Legal, Legislative and Commercial nuances will need to be considered to achieve workable project contracts. Many standard clauses for the sake of conciseness have been omitted and we've concentrated on clauses that the Landlord / Tenant relationship will have greatest impact. A comprehensive overview of all contract clauses can be found.

SEAI-EXEED-ESCO-Contract-Template.pdf

A1.1 CONTRACT OVERVIEW

This Energy Performance Contract (the "**Contract**") is made and entered into as of the day of **[]** between:

(1) [**INSERT Landlord**] having its registered office at [] (the "**Client 1**"); and

(2) [**INSERT Tenant**] having its registered office at [] (the "**Client 2**")[8]; and

(3) ABC (the "**ESCO**");

each a **"Party"** and collectively the "**Parties"**) for the purpose of installing certain energy and operating cost saving equipment and provision of other services, as detailed in the accompanying Service Level Agreement, to save energy and costs for the Client's property and buildings, known as [INSERT SITE NAME], located at [INSERT ADDRESS] (the "Project Site(s)"), and improve the overall sustainability of the Client's business.

A1.2 RECITALS

WHEREAS, this Contract sets out to provide a workable framework between the Clients and the ESCO in providing energy & sustainability advice over the contract period;

WHEREAS, the ESCO has outlined to the Clients an estimated energy cost savings opportunity of €x1/annum for Client 1 and €x2/annum for Client 2 and a CO_2 reduction of Y1 ton CO_2eq/annum for Client 1 and Y2 ton CO_2eq/annum for Client 2[9], which is to be unlocked through a combination of building assessment, engineering redesign, integration of smart technologies and a rigorous regime of monitoring and verification in addition to delivering new technologies and improved engineering efficiency over the course of the Contract period (as outlined in the accompanying Service Level Agreement);

WHEREAS, the Client 1 and Client 2 operate the Premises 1 and Premises 2 respectively, Client 1 is the owner of both the Premises 1 and 2, and requires energy and operating cost saving equipment and other sustainability related services; and

WHEREAS, the ESCO, in a first stage, will conduct an Investment Grade Audit (IGA), that will refine the initial proposal in order to reduce risks for all Parties, and will include comprehensive coverage of the Energy Conservation Measures (ECMs) to be installed, capital costs, savings (including financial and tonnes of CO_2), payback period and the measurement & verification (M&V) plan separately for the premises operated by Client 1 and Client 2; and

WHEREAS, the Clients wishes to engage the ESCO to procure, install, operate and maintain certain energy-saving equipment and to provide other services described in accompanying Service Level Agreement (in the appendix). This agreement states all the services, in detail, that the ESCO commits to provide to the Clients.

The ESCO will ideally deliver this service in two distinct phases – the first with low cost interventions harvesting easy win savings , the second in more capital intensive interventions that will yield greater savings and carbon reductions but with longer payback. This template may be used for Phase 1 and Phase 2 or for Phase 2 alone.

As Client 2 represents the Tenant there are likely to be many cases where contracts attempt to aggregate or have multiple Client 2 type profiles.

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[8] More Clients (tenants) may be included for a multitenant building.

[9] Add more Clients if applicable (tenants).

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101033744.

A1.3 DEFINITIONS & INTERPRETATION

The following words and expressions shall have the following meanings respectively:

Actual Energy Cost Savings	means the reduction in the monthly energy costs at the Premises saved as a result of the Works determined by comparing the actual energy costs after the Works for the relevant Guarantee Month to the previously established Baseline energy costs. They are evaluated for each Client involved in this EPC.
Baseline	means the monthly energy consumption (day electricity, night electricity and natural gas) of the baseline year, against which energy savings will be measured.
Budgeted Energy Savings	means the expected monthly energy saving at the Premises as a result of the Works determined by comparing the expected energy costs after the Works to the previously established Baseline energy costs. The Budgeted Energy Savings will not be constant since this project involves a phased implementation of works (over 3 years). See schedule A (subject to IGA).
Commencement Date	means the date from which the Energy Savings shall be calculated under this Agreement, being the first day of the next month after the commissioning of the first stage of works (this project involves a phasing of implementation works). Clients 1 and 2 may have different commencement dates for the energy efficiency service that they receive from the ESCO.
Energy Type	means night electricity, day electricity and natural gas.
Equipment	means the goods, materials and equipment to be installed at the Premises operated by each Client by the ESCO, as part of the Works together with any and all additions and modifications made thereto during the Term. The equipment is normally purchased by Client 1 that is the owner of all the premises including those operated by Client 2. Alternatively, the ESCO may purchase the equipment and lease it to the Clients.
Existing Equipment	means the energy related equipment owned by each Client and installed at the Project Site(s) prior to the execution of this Contract
IGA	means Investment Grade Audit. The accompanying Service Level Agreement to this Contract details the scope of works carried out under the Investment Grade Audit.
Service Level Agreement	means the document that details all services the ESCO must provide to the Client in the context of this Contract and can be found in the appendix of this document.
Guaranteed Savings Threshold	means the level of guaranteed savings to the Client. The ESCO will apply different guaranteed savings thresholds to the Clients defined in this EPC depending on the equipment that installed at the premises that they operate. If the actual annual savings are lower than the Guaranteed Savings Threshold, the ESCO must financially compensate the Clients in the difference between actual savings and the corresponding Guaranteed Savings Thresholds. Savings higher than this threshold are shared between ESCO and Clients in a proportion defined in Clause 8.c.
Energy Cost Savings of Client 2 (tenant) paid to Client 1 (landlord)	means the fixed fraction of the monthly energy cost savings that Client 2 (tenant) obtains which is paid to Client 1 (landlord) by the ESCO to incentivize the energy efficiency project (that requires equipment purchase and installation of energy efficiency measures paid by Client 1 in the premises operated by Client 2). This fraction will be agreed by the parties, and it is up to 100% of the energy cost savings of Client 2.
Performance Period	means the period that extends from the Commencement Date until 8 years after (96 months). There are 3 Performance Periods that start at different points. Performance Period 1 starts upon commissioning of main building works and applies to Client 1 only (landlord), Performance Period 2[10] starts upon commissioning of tenant and applies to Client1 and Client2[11] and Performance Period 3 starts upon commissioning of PV project. Each Performance Period lasts normally for 96 months. See Schedule A for clarification.
Works	means the management, procurement, construction, installation, testing and commissioning works to be carried out by the ESCO as more particularly described in the IGA at the premises operated by Client 1 and Client 2.

[10] This period may be divided into two subperiods, where only low-cost measures are installed in the first subperiod and any measures are installed in the second subperiod.

[11] Consider more performance periods in case of multitenant building.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101033744.

A1.4 Specific Detail

PHASE 1 – DESIGN AND DELIVERY OF OPTIMUM SOLUTION

Project Planning / Investment Grade Audit

a. The ESCO will build on a proposal already developed and presented (as per Schedule A) to work up a detailed and fully engineered and costed upgrade scope. This will yield the following key information:

   i. Scope of works / ECMs to be implemented,

   ii. Capital costs,

   iii. Energy savings, cost savings and CO2 savings,

   iv. Energy Baselines (Monthly)

   v. Routine adjustments to Baseline (accordingly to Heating Degree Days and occupancy)

   vi. Total Budgeted Energy Savings

b. The Clients agree to work diligently to provide full and accurate information.

c. The ESCO agrees to work diligently to assess the validity of the information provided and to confirm or correct the information as needed.

d. The Parties contemplate that this will be an interactive process and that the Client will have a reasonable amount of time to review the IGA, at different development stages.

e. Once the IGA is completed, it will be presented to the Client a full suite of opportunities, actionable scope and details of the Measurement and Verification Plan that shall be agreed with the Client. The Client must issue a Notice of Acceptance of Investment Grade Audit which is an indication to proceed to the implementation stage.

Project Design/Implementation Stage

a. The Scope of Works will be detailed in the IGA and will be approved upon issue of Notice of Acceptance of Investment Grade Audit. The accompanying SLA and Schedule A provides an overview of implementation timelines.

b. As per the accompanying Service Level Agreement, the ESCO shall provide the design services for the systems that are part of the optimum solution identified in the IGA, project management and supervision of all sub-contractors, equipment and sub-contractor procurement, energy procurement and bills analysis, accessing government grants and an initial assessment of the Client's carbon footprint.

c. The ESCO shall supervise and direct he Works and shall ensure that the completed Works are fit for their intended purpose and shall be responsible for all construction and installation means, methods, techniques, sequences and procedures and for coordinating all elements of the Works.

d. All equipment and installation costs are borne by the Client.

PHASE 2 – DELIVERY OF ENERGY SAVINGS

Services for Delivery of Energy Savings

a. The Services to be provided during the duration of this Contract are detailed in the contracts Service Level Agreement (Phase 2 services).

b. Phase 2 services shall be initiated upon commissioning of works and start of Performance Period 1 and last until the end of Performance Period 3.

c. The ESCO shall perform the Services with all the skill, care, diligence, efficiency and professional conduct reasonably to be expected from a professional with the qualifications and experience suitable for the performance of the Services and in the appointment and monitoring of its agents, employees and Subcontractors and shall do so in accordance with the provisions of this Contract.

Equipment Service

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101033744.

a. The Client may not make any changes (move, remove, alter, add accessories, etc.) to the operation and maintenance of the equipment without the prior written approval of the ESCO, unless in an emergency when the ESCO cannot be reasonably notified.

b. The Client commits to use only suitable qualified maintenance specialists.

c. The Client shall use reasonable endeavours to notify within 24 hours the ESCO of it becoming aware of the occurrence of any malfunction or emergency condition affecting the operation of the Equipment or Existing Equipment that might impact upon the Energy Savings, such as, but not limited to:

    I. Any malfunction in the operation of the Equipment or any pre-existing energy related equipment that might materially impact upon the guaranteed energy savings;

    II. Any interruption or alteration to the energy supply of the Project Site(s);

    III. Any alteration or modification in any energy-related equipment or its operation.

d. All services the ESCO commits to provide, in relation to Equipment Maintenance Services, for the duration of this Contract are detailed in the accompanying Service Level Agreement.

e. The ESCO shall have no responsibility for performing maintenance, repairs or making manufacturer warranty claims relating to the Equipment, other than the services mentioned in the Service Level Agreement.

f. All costs related to fixing or replacing faulty equipment are borne with the Client.

PHASE 3 – CARBON REDUCTION JOURNEY

Services for Carbon Reduction Journey

a. The Services to be provided during the duration of this Contract are detailed in the accompanying Service Level Agreement (Phase 3 services).

b. Phase 3 services shall be initiated upon commissioning of works and start of Performance Period.

c. The ESCO shall perform the Services with all the skill, care, diligence, efficiency and professional conduct reasonably to be expected from a professional with the qualifications and experience suitable for the performance of the Services and in the appointment and monitoring of its agents, employees and Subcontractors and shall do so in accordance with the provisions of this Contract.

MEASURMENT, VERIFICATION, GUARANTEE & PAYMENT

Savings Guarantee

a. ESCO will financially guarantee 60% (variable / contract) of the Budgeted (Estimated) Energy Cost Savings:

    i. Annually, if the % Savings fall short of a Guaranteed 60% Savings from baseline to anticipated savings (Budgeted Energy Cost Savings to be defined after IGA), ESCO must compensate Client 1 and /or Client 2 the relevant difference.

b. The Guaranteed Savings Threshold is a function of the Budgeted Energy Cost Savings (60% of Budgeted Energy Cost Savings), which is not constant across the Contract duration due to phasing out of implementation of works (see Schedule A).

c. The calculation of Clause 8.a. will follow the International Performance Measurement and Verification Protocol (IPMVP) and fully respect baseline changes. The baseline changes will respect the baseline routine adjustments laid out in the IGA (according to outdoor air temperature and occupancy levels) and Clause 10 of this Contract.

Energy Savings Calculation & Payment

a. The Client agrees to provide the ESCO direct access to utility bill information, by automated data transfer as feasible.

b. From the Commencement Date the Clients shall pay the ESCO the Monthly Payment which shall be payable by the Client within 30 days of the end of the calendar month to which the payment relates.

c. From the Commencement Date of the Performance period 2, the ESCO shall pay a monthly amount to Client 1 that is proportional to the energy cost savings achieved by Client 2 proportional to Client 1's investment where they are responsible for the generation of those savings. Where Client 2 achieves savings through operational changes or investments he makes then these must be separated and Client 1 cannot receive saving payments associated with these.

d. Monthly Reporting and Reconciliation period of 3 month initially and 6 months thereon apply to both Client 1 and Client 2.

e. The Monthly Payments will be in effect from the commencement of Performance Period 1 (commissioning of 1st Stage of works in Premises 1) until the end of Performance Period 3 (96 months after commissioning of PV project)

f. The calculation of Actual Energy Cost Savings will follow the International Performance Measurement and Verification Protocol.

g. The Baselines, against which Actual Energy Cost Savings will be measured, will be determined in the IGA and approved by the Clients upon issuance of Notice of Acceptance of Investment Grade Audit. Schedule A contains provisional values for the Budgeted Energy Cost Savings. These are not constant throughout the years since the implementation of this Contract is phased in time.

h. Actual Energy Cost Savings are measured individually for each Energy Type (night electricity, day electricity and natural gas) and their respective Baselines.

i. The Monthly Payment to the ESCO shall include the 65% of Actual Energy Cost Savings achieved above the Guaranteed Savings Threshold. Table and chart in Schedule B present this in a visual format.

j. Where Actual Energy Cost Savings are lower than the Guaranteed Savings Threshold, the ESCO shall financially compensate the Clients and Clause 8 applies.

k. The ESCO will calculate the above savings at the end of each month and provide the client with a copy of same and a VAT invoice.

Adjustment of Values for the Baseline Energy Consumption

a. Routine adjustments to the Baseline will be done in accordance to Heating Degree Days, occupancy rates and meals following the methodology that will be laid out in the IGA.

b. In the calculation of Energy Savings the Baseline shall subject to the provisions set out in the IGA, that requires the Client's formal approval, and will remain constant for the duration of this Contract, except in circumstances where there is:

    i. a change in the use of all or part of the Project Site(s);

    ii. a modification to or enlargement of the Project Site(s);

    iii. implementation of new standards and/or any kind of regulation governing lighting, temperature, relative humidity or ventilation conditions in the Project Site(s)

    iv. additional enhancements to or reduction of the scope of the Works requested by the Client which differ from those proposed in the Investment Grade Audit and Design Documents;

    v. replacement or repair of the Equipment and/or Existing Equipment in order to improve its efficiency or functionality;

    vi. additional work requested in writing by the Client that results in an increase or decrease in the amount of Energy used within the Premises;

    vii. other changes affecting the Baseline.

c. After consultation with and upon prior written approval by the Client the ESCO may, if it deems it necessary, increase or decrease the Baseline as a result of any of the changes referred to in Clause 10.b. This assessment must take place across both Client 1 & Client 2 premises so that there is equity in the baseline adjustment.

Provisions for Phased Implementation of Works

a. Where project phases occur across milestone timelines the savings calculations will adjust and increase as additional projects are executed. This will require adjustment and recalculation of savings apportionment and needs to get both Client 1 & Client 2 agreement

b. Upon commissioning of each of the Work Stages, a new Performance Period commences that increases the Budgeted Energy Cost Savings, and consequently the Guaranteed Savings Threshold (which is always 60% of the Budgeted Energy Cost Savings). See Schedule A for clarification.

c. In the same way, when each Performance Period ends, the Budgeted Energy Cost savings is reduced, since the payment relative to those respective energy conservation measures is completed. See Schedule A for clarification.

MISCELANEOUS

ESCO as Works Supervisor, Project Governance, Assignment & Subcontracting

a. The ESCO is deemed to be the prime Works supervisor under this Contract and the ESCO assumes full responsibility for the delivery of the Works and/or Services and shall assume all the duties, responsibilities and obligations associated with the position of supervisor for all Works.

b. The ESCO shall require its employees, agents and Subcontractors to exercise due skill, care, diligence, efficiency and professional conduct in the carrying out of any obligations allocated, assigned or subcontracted by the ESCO to its employees, agents and Subcontractors pursuant to its obligations under this Agreement.

Disruptions to Energy Cost Savings Performance

a. In the event of any failure or delay in Energy Cost Savings performance for *force majeure* or reasons that fall outside the control and cannot be remediated by either Party (e.g. restrictions or restraints of governmental authorities whether State or local, war, revolution, civil commotion, natural disasters, vandalism, acts of civil or military authorities) the following provisions apply:

   i. If the Contract was ongoing for over one year, the Client's payments to the ESCO will be fixed based on the average of the Energy Cost Savings previously achieved. This remains until the Project Site(s) returns to normal operation.

   ii. If the Contract was ongoing for less than a year, the Client's payments to the ESCO will be fixed based on the Budgeted Energy Savings (determined in the IGA). This remains until the Project Site(s) returns to normal operation.

b. Dependant on agreement from the Parties, the Contract can be suspended and later extended in the same number of months for which the suspension took place. In this case, Clause 13.a. is overruled.

c. In the case the Client fails to notify the ESCO of a change in operating conditions and equipment (e.g. increase of temperature set points, addition of new energy consuming equipment, change of activities in some spaces, etc.) and this materially impacts the Actual Energy Cost Savings in a given month, the ESCO holds the right to invoice an amount based on the average performance of the previous months.

d. If the client fails to notify the ESCO within 24 hours of a malfunctioning equipment (Clause 6.a) that negatively affects energy savings, and/or does not initiate corrective actions within 5 business days, ESCO holds the right to invoice an amount based on the average performance of the previous months.

Notice

a. Any notice required or permitted hereunder shall be deemed sufficient if given in writing and delivered personally or sent by registered or certified mail to the address shown below or to such other persons or addresses as are specified by similar notice.

To the Clients: Attention: Include Copy to:

Termination and Consequences of Termination

a. The Client shall be entitled to terminate the Contract, without any further payment, by written notice to the ESCO during the Term of this Contract if:

   i. the ESCO fails to meet the Guaranteed Savings Threshold for a total of 12 months or more within any 18-month period of the Performance Period;

   ii. the ESCO's design or installation is flawed, and the equipment is not operating properly and the ESCO does not take corrective action within 45 days after receipt of written notice of such breach having been served by Client;

   iii. the ESCO commits any material breach of the terms hereof and fails to remedy same within 45 days after receipt of written notice of such breach having been served by Client; or

b. When Clauses 14.a.i, 14.a.ii and 14.a.iii are not met, the Client shall be entitled to terminate the ESCO's obligations under this Agreement at its election on 30 business days' notice in writing to the ESCO. In this case, the Client must pay to the ESCO:

   i. 12 additional months of monthly payments based on an average of the performance to the date that the termination notice was issued in addition to any outstanding invoices and costs the ESCO has incurred in.

c. The ESCO shall be entitled to terminate the Contract, without any further obligation, by written notice to the Client during the Term of this Contract if:

   i. If the Client fails to pay the ESCO any sum due for a service for a period of more than 60 days after written notification by ESCO that Client is defaulting in making payment, and provided the ESCO is not in default in its performance under this Contract;

   ii. the Client commits any material breach of the terms hereof and fails to remedy same within 45 days after receipt of written notice of such breach having been served by Client; or

d. When Clauses 14.d.i and 14.d.ii are not met, the Client shall be entitled to terminate the ESCO's obligations under this Agreement at its election on 30 business days' notice in writing to the ESCO. In this case, the Client must pay to the ESCO:

Events of Payments Default

a. If the ESCO fails to pay the Client any owed Guarantee, for a period of more than 60 days after written notification by Client that ESCO is defaulting in making payment, and provided the Client is not in default in its performance under this Contract, the Client holds the right to exercise all remedies available at law or in equity or other appropriate proceedings for recover of amounts due by the Client and/or for damages which shall include all costs and expenses reasonably incurred in exercise of its remedy.

b. If the Client fails to pay the ESCO any sum due for a service for a period of more than 60 days after written notification by ESCO that Client is defaulting in making payment, and provided the ESCO is not in default in its performance under this Contract, the ESCO holds the right to exercise all remedies available at law or in equity or other appropriate proceedings for recover of amounts due by the Client and/or for damages which shall include all costs and expenses reasonably incurred in exercise of its remedy.

Dispute Resolution

a. If a dispute or difference arises between the Parties with regard to or in connection with this Agreement, such dispute shall be referred in writing to senior members of each of the Client and the ESCO who will use good faith efforts to resolve such dispute within 30 (thirty) days of such referral.

   If the Parties are unable to resolve the matter within the thirty (30) day period in Clause 13.1 the Client and the ESCO will attempt to resolve the dispute in question by mediation. Any such mediation will be conducted by a mediator to be mutually agreed upon between the Parties or in the absence of such agreement upon the request of either Party to the Chairman for the time being of the Chartered Institute of Arbitrators, European Branch.

Governing Law

This Contract shall be governed by and confirmed in all respects in accordance with the laws of relevant European Country.

A1.5 Savings and Cost Estimates

The payments schedule for the remaining works (Client 2 Upgrades and PV project) are to be agreed between ESCO and Client before their implementation (€x).

For Phase 2 (Delivery of energy savings) and Phase 3 (Carbon Reduction Journey) the payment is based on Actual Energy Cost Savings each month. The ESCO will receive payments of 65% of the energy cost savings achieved beyond the Guaranteed Savings Threshold (which is 60% of the Budgeted).

A1.6 Schedule A – Scope of Works and Proposal

List of ECMs:

ECMs	Cost	Annual Savings	Payback	Landlord	Tenant
Heat Pumps			4.4	×	×
Back of house lighting			2.9		×
Controls/ventilation			3.0		×
Pump replacement			5.4	×	
72 kWp PV installation			9.1	×	×
Wireless TRVs			2.7		×
Monitoring system				×	×
Renewable Heat Support Scheme Grant			-		
EXEED Grant			-		
TOTAL			**3.4**		

A1.7 Schedule B – Payments Schedule

For Phase 1 (Design and Delivery of Optimum Solution) the payment to the ESCO works will be of ….. The table below details the payments for each item to be paid in the first implementation stage (Premises owned and operated by Landlord), which amount in total to €…. Some items will only start to be mobilised by the ESCO upon receiving a pre-payment. The final payment will be executed when the item has been completed.

APPENDIX 2: FLEXIBLE TARIFF TEMPLATE

The analysis performed in section 4 in relation to flexible-dynamic tariff design has been used to design a contractual template that retail companies serving commercial consumers can use to reward clients' flexibility that can shift their energy consumption from high-price hours to low-price hours of the day (referring to System Marginal Prices) with a very convenient dynamic electricity tariff. If clients can't deliver the level of flexibility agreed in the contract (load reduction in peak hours or shifting to non-peak hours), a higher tariff will be applied to compensate higher electricity costs associated with higher electricity consumption during peak/high price hours.

A2.1 Contract Overview

This Electricity Supply Contract (the "**Contract**") is made and entered into as of the day of **[01/07/2023]** between:

(1) [**INSERT Client**] having its registered office at [] (the "**Client**"); and
(2) [**INSERT Electricity Supplier**] having its registered office at [] (the "**Electricity Supplier**");

each a **"Party"** and collectively the "**Parties"**) for the purpose of supplying electrical energy using a Flexible Tariff, to reduce monthly electricity costs for the Client's property located at [INSERT ADDRESS].

A2.2 Recitals

1. This Contract sets out to provide electricity supply at a convenient rate accounting for the possibility to avail of flexibility in electricity consumption offered by the Client, which enables to shift consumption from peak hours to non-peak hours;

2. The Client provides daily electricity consumption data from 5:00 to 11:00 and from 15:00 to 2:00 (peak hours) for the past 12 months as well as the amount of electricity consumption that can be reduced in those peak hours and/or moved to non-peak hours (flexibility in electricity consumption);

3. The Electricity Supplier after analysing the electricity consumption and flexibility data provided by the Client outlines to the Client a discounted electricity tariff of x_1 €/kWh from 8:00 to 20:00 (day tariff), and of x_2 €/kWh from 20:00 to 8:00 (night tariff) provided that the Client agrees to be flexible with electricity consumption reducing the average consumption in a month of at least C_1 kWh from 5:00 to 11:00 and of at least C_2 kWh from 15:00 to 2:00.

4. The Electricity Supplier outlines that it is acceptable that the consumption is increased up to z_1 kWh from 11:00 to 15:00 and up to z_2 kWh from 2:00 to 5:00 (non-peak hours) without affecting the electricity tariff that is applied (electricity consumption shift).

5. The Electricity Supplier outlines that if the total average reduction in electricity consumption C from 5:00 to 11:00 and from 15:00 to 2:00 in a month is lower than the agreed target $C_1 + C_2$ then the electricity tariff applied to the Client will be increased of an amount $\alpha(C_1 + C_2 - C)$ where α represents the tariff increment in € for each kWh of energy consumed in excess of the agreed reduction (flexibility) in the peak hours $C_1 + C_2$. In such case the electricity tariff applied by the electricity supplier to the Client will be [$x_1 + \alpha(C_1 + C_2 - C)$] €/kWh from 8:00 to 20:00 (day tariff), and from [$x_2 + \alpha(C_1 + C_2 - C)$] €/kWh from 20:00 to 8:00 (night tariff).

Day	Electricity consumption peak hours 05:00 – 11:00	Flexibility peak hours 05:00 – 11:00	Electricity consumption peak hours 15:00 – 02:00	Flexibility peak hours 15:00 – 02:00
01/01/2023	40 kWh	15 kWh	62 kWh	20 kWh
02/01/2023	38 kWh		59 kWh	
03/01/2023	41 kWh		55 kWh	
04/01/2023	36 kWh		57 kWh	
…	…		…	
01/02/2023	37 kWh	12 kWh	59 kWh	17 kWh
02/02/2023	35 kWh		43 kWh	
03/02/2023	29 kWh		51 kWh	
			49 kWh	
Please include one year data				

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