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SmartSPIN

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

**Call topic:** H2020-LC-SC3-2018-2019-2020
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## D3.1 – REVIEW ON LEGAL ASPECTS

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

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## List of Abbreviations

| Abbreviations | |
|---|---|
| **BER** | Building Energy Rating |
| **BPIE** | Buildings Performance Institute Europe |
| **CA** | Concerted Action |
| **CEER** | Council of European Energy Regulators |
| **CRU** | Ireland Commission for Regulation of Utilities |
| **DSO** | Distribution system operators |
| **DSU** | Demand Side Unit |
| **DR** | Demand Response |
| **EC** | European Commission |
| **EEaaS** | Energy Efficiency-as-a-Service |
| **EPBD** | Energy Performance of Buildings Directive |
| **EPCs** | Energy performance contracts |
| **ESCOs** | Energy service companies |
| **EU** | European Union |
| **GDPR** | General Data Protection Regulation |
| **ICT** | Information and Communications Technology |
| **IEA** | International Energy Agency |
| **KPIs** | Key performance indicators |
| **LEED** | Leadership in Energy and Environmental Design |
| **M** | Month |
| **MV** | Medium Voltage |
| **O&M** | Operation and Maintenance |
| **R&D** | Research and development |
| **SEAI** | Sustainable Energy Agency Ireland |
| **TSO** | Transmission system operator |
| **WP** | Work package |

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## EXECUTIVE SUMMARY

SmartSPIN is a project funded by the European Union's Horizon 2020 Research and Innovation programme under Grant Agreement No.101033744. The project aims at developing, testing and validating a new business model to improve the energy efficiency and flexibility in the commercial rented sector. The SmartSPIN consortium will design, demonstrate, implement and test smart energy solutions in three European pilot sites in Ireland, Spain and Greece.

The contractual service model definition shall consider all legal aspects and bring out the most optimized model in all legal, financial, technical and business aspects to address the split incentive issue. The objective of the **Task 3.1- Review of legal aspects** is to conduct a review analysis on the existing and potential challenges with legal and contractual aspects with legislations, regulations and market situations. This report emphasizes the review of the legal and contractual challenges of energy efficiency measures and performance-based contracts for the target group of commercial rented sector buildings. In scope, the review study addresses the European Union perspective in general but focuses on the specific approaches for the three demonstration site countries of Ireland, Spain and Greece.

Throughout this task and the report, while addressing the split incentive issue, energy efficiency measures and legal aspects, the impact of the existing O&M contracts, the impact of pre-existing tenancy agreements, the impact of equipment warranties and technical requirements for demand response, the impact of GDPR and data protection on smart metering, the situation and plans on energy communities and P2P trading and the situation and plans on sub-metering of the tenants has been discussed. It is found through international case studies that where the initiatives are introduced, the stakeholders are more willing to contribute and participate in the energy efficiency interventions and investments for the building energy systems retrofits. Voluntary and mandatory schemes are brought by various levels of nations and the union, so the directives and regulations are paving the way, and strong case studies and success stories are having a positive impact on accelerating the transition of the general stock. It is expected to see an accelerated growth in the markets to address such issues, according to the plans and scenarios of 2030 and 2050, considering the regulations, incentives and applications, and the market developments.

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# 1 INTRODUCTION

The building stock is the largest energy consumer in responsible of the 40% of energy consumption and the 36% of the carbon emissions in the European Union[1]. In order to overcome the prevailing modernization backlog and to achieve the European $CO_2$ reduction and energy efficiency targets, the modernization rate in the building stock must be significantly increased.

The 75% of all EU buildings are deemed energy inefficient and the annual rate of renovation is only 1% in Europe[1]. Building renovations in the commercial rented sector are hindered by the conflict arising between a landlord and a tenant when the benefits of a transaction do not accrue to the person who pays for it. This issue is called the “split incentive problem” and currently represents one of the biggest market barriers to energy efficient building renovations in the commercially rented sector. This dilemma typically occurs in rented facilities where the main beneficiary of energy saving measures is the user/tenant, while the responsibility for energy efficiency related investments is with the owner.

Within the project before the implementation of smart energy solutions, the situation has to be well-analyzed and new service models will be developed and recommended. The **Work Package 3** focuses on contractual service definition while addressing the split incentive problems in rented sectors. While and before defining the contract design, SmartSPIN service, contract and tariff designs and developing recommendations and potential solutions, a review of the existing situation needs to be conducted. The objective of the **Task 3.1** is to conduct a review analysis on the existing and potential challenges with legal and contractual aspects with legislations, regulations and market situations.

Currently, a solution model definition is needed for addressing various challenges and issues for a stronger and faster roll-out of Energy Performance Contracting (EPC) as an energy service application model in the commercial rented sector as well, following the public sector.

This task addresses a review of the legal and contractual challenges that can prevent clients (particularly in the commercial rented sector) from entering into performance-based contracts for energy management and implementation of energy efficiency measures. The following issues are examined:

- The impact of any pre-existing operation and maintenance contracts that landlords may have on their ability to enter into an EPC of similar performance-based contract with an ESCO.
- The impact of any clauses typically found in leases or tenancy agreements between landlord and tenant that impacts on energy consumption (e.g. a requirement that building is available for use by the tenant at any time).
- The impact of equipment manufacturers warranty’s and operating guidelines on the ability to implement proposed energy efficiency or flexibility activities.
- How to ensure security of data gathered from smart sensors and smart meters and privacy rights of building occupants are maintained.

[1] Energy Performance of Buildings Directive, European Commission

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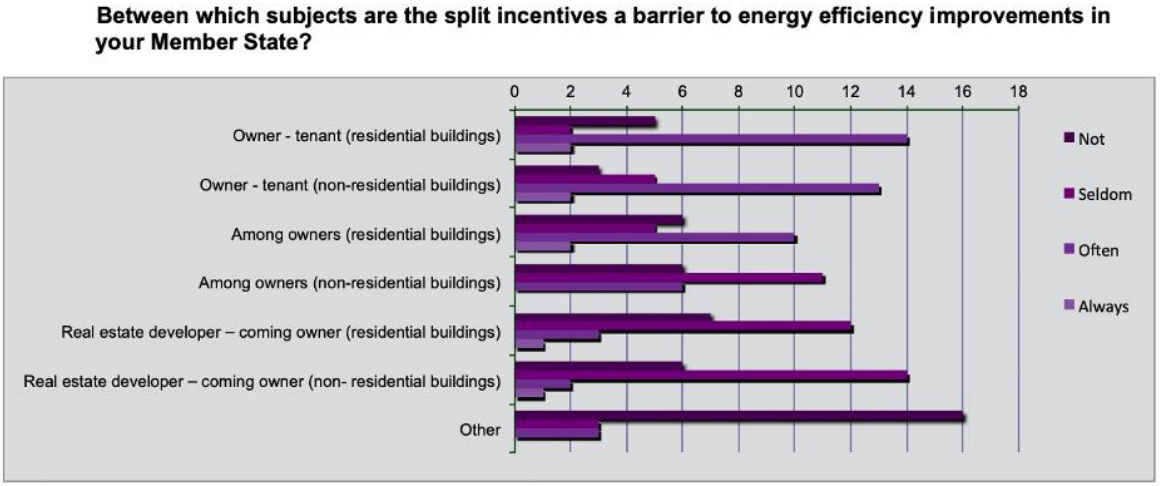


**Figure 1.1 The split incentives as a barrier for varying subjects.**


**Figure 1.2 Importance of split incentives as a barrier compared to the other existing barriers**

For the non-residential public sector and split incentives inside organizations, all-inclusive rent and life cycle costing approaches should be considered. Also the creation of an internal revolving fund fed by savings from implementing energy efficiency improvements should be evaluated if compatible with legislation and accounting rules. For the non-residential sector there is a lot of interest in green leases (a collaborative owner-tenant approach to save resources and money) although few have been implemented by the Member States. The main support for this practice is model contracts or an interactive web platform.[2]

According to the Figure 1.1 showing the results on research of split incentive as a barrier, it is clear to say that the issue “stated as often” acts as barrier to energy investments between owners and tenants both for residential and non-residential buildings. Moreover, according to the Figure 1.2 showing the results of importance of this on a building type, it can be clearly defined “stated as important” that the problem brings significant importance especially for non-residential public and private buildings. So, considering all these information and feedback, within the SmartSPIN project,

[2] Split Incentives, Concerted Action, Energy Efficiency Directive, 2014.

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our main focus would be to bring out a model and methodology for the split incentive issue between owner and tenant for non-residential, so here commercial buildings in private rental sector, as it is stated as an often problem and important barrier to address.

The information within this report is gathered via the EU legislative documents, local legislations, existing market situation in Europe, with a particular focus on the partner countries of the pilot sites, Ireland, Spain and Greece.

## 2 LITERATURE REVIEW OF EUROPEAN SPLIT INCENTIVE ISSUE

The first step to tackle **Task 3.1** is to conduct an exhaustive literature review of the existing European research on the split incentive issue. Some Horizon 2020 projects looked specifically at this problem: **Tenlaw, GuarantEE, LEMON, SENSEI and EuroPACE.** For the purpose of this task, we only analyze the work done on pinpointing the key legal aspects that affect energy renovations in rented properties.

In conclusion, the reference Horizon 2020 projects previously mentioned do not appear to contain adequate relevance for addressing the split incentive issue in commercial rental sector for SmartSPIN. The analysis is presented in Table 1

**Table 2-1: Reference Horizon 2020 Projects and their relations to SmartSPIN**

| Project Name | Relation to the SmartSPIN |
|---|---|
| **Tenlaw** | The Tenancy law and housing policy in multi-level Europe (Tenlaw) project provides a large scale comparative analysis of European tenancy law. The project focuses on the residential sector, so it lacks the perspective information on the commercial rented sector. |
| **GuarantEE** | The Energy Efficiency with Performance Guarantees in Private and Public Sector (guarantEE) project agrees that the split incentives dilemma typically occurs in rented facilities where the main beneficiary of energy saving measures is the user/tenant, while the responsibility for energy efficiency related investments is with the owner.<br>Within the guarantEE project, 14 experienced partners developed innovative business models for performance-based ESCO projects. For rented facilities, solutions were developed and tested that targeted adequately sharing of costs and benefits between users, building owners and ESCOs (triple-win approach). With a special focus on building owners in the private sector, EPC contract variants were developed that provide enhanced flexibility. |
| **LEMON** | This project looked at the residential sector, in particular for housing associations. The findings around policies and regulations are not relevant for SmartSPIN, because it lacks information on commercial rented sector. |
| **SENSEI** | SENSEI combines pay-for-performance (P4P) arrangements with the Energy Performance Contracting (EPC) model and engages in negotiation games with preliminary stakeholders. This offers the possibility for stakeholders to shape the SENSEI business models according to their needs. The incentive is redirected from installing as many equipment as possible to obtaining as many energy savings as possible. |
| **EuroPACE** | EuroPACE intends to develop an innovative financing mechanism to boost energy efficiency investment in existing residential buildings. The project provides a legal and fiscal analysis of the EU-28 Member States, but it focuses on residential buildings, and lacks the commercial rental sector. |

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Furthermore, The Irish Green Building Council's Report from February 2019 on the "Overcoming the split incentive barrier in the private rental market – International Case Studies" has been analyzed in depth for the purpose of the SmartSPIN model definition and the review of the legal aspects. The report shares the introductory information on the existing initiatives and the rental property market in Ireland, then focusing on the international case studies for commercial and residential sectors with regulatory schemes, initiatives, required minimum energy performances, and the contractual approaches with voluntary and mandatory green leases. So, the paper shares exemplary international cases from Europe and all around the world and shows the general potential of increased interest of stakeholders in the energy efficiency investments for the buildings. The paper brings valuable feedback on the legislations and approaches for overcoming the barrier.

# 3 LEGAL SITUATION AND CONTRACTUAL CHALLENGES

## 3.1 IMPACT OF EXISTING O&M CONTRACTS

Office Building Maintenance is conducted to keep a facility and its equipment in optimum condition and to extend the facility's life where possible. Active and passive elements make up office building maintenance requirements. The electrical and mechanical services are harder to assess, and these require regular preventative building maintenance in order to ensure they meet the legislative requirements and to ensure their full operational life cycle.

Building maintenance contracts are most commonly used in a business setting and include services for:

- Cleaning and upkeep
- Repairs
- Troubleshooting
- Equipment management (HVAC, plumbing, electric, etc.)
- Depending on the type of company hiring the maintenance services, they might also require maintenance for computers, vehicles, or medical equipment.

An important part of the contract is the section that spells out exactly what services are expected. This part of the contract is expected to be regularly reviewed and revised, especially if any new maintenance needs arise. So, renewal of these could decrease a possibility of an act of barrier.

### 3.1.1 IRELAND

O&M tends to be renewed annually with many contracts and in that landscape the aforementioned will not be a barrier as such however in situations where longer term contracts exist a barrier situation might arise. Where annual contracts exist there is usually a very defined service scope and it is a commodity based service in that usually lowest price award criteria. One potential complication that could be argued as a barrier, is where ESCO carries out upgrade/replacement of energy equipment and contracts its maintenance for a defined service period of 5 to 8 years. The equipment that falls outside this contract will still need maintenance and for some sites and clients the complication of two maintenance regimes and contractors simultaneously is unattractive. This can generally be overcome by the ESCO contractor taking on all of the maintenance both new and legacy equipment.

Another complication that can impact a new engineering-based maintenance model is where existing facility management has bundles soft services with hard services i.e. security, cleaning etc. with engineering services. In this context the complication of separating these and extracting them can create a change challenge. Revisiting and redesigning the establishment of procurement norms could act as a barrier to change.

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### 3.1.2 SPAIN

In Spain the O&M agreements related to a performance-based contract depend on the type of asset underlying the project and the commitments made with the financiers[3]. O&M agreements are based on service provision schemes establishing a contractual relationship between the project company and the company operating and maintaining the project.

There are three options to establish O&M agreements in a performance-based contract[4]:

- The project company or one of the stakeholders operates and maintains the project.
- The project company operates and maintains the project with the help of consultants.
- The project company hires a professional operator to manage and maintain the project.

The main limitation in entering a performance-based contract arises where there is already O&M contract in place and the landlord would encounter a penalty in case of early contract termination (due to their will of entering in a performance-based contract). In this case, the costs associated to the early termination or revision of an existing O&M contract should be subtracted by the rewards generated by the performance contract and might make it economically inconvenient. Limitations arising from existing O&M contracts could be overcome through establishing an appropriate policy for O&M contracting within the performance-based contracting, with the participation of all the EPC stakeholders, including project financiers, landlords, O&M operators, energy service companies (ESCOs).

This policy should enable to transfer existing O&M contracts to the EPC contract if the O&M contractor wishes to do so, and not allowing the ESCO to consider lower O&M costs when performing the energy service offer unless the O&M contractor agrees to revise their current contract.

### 3.1.3 GREECE

While the Greek energy performance contacting (EPC) market is still underdeveloped, upon review of the existing O&M agreements related to a performance-based contracts it is obvious that some degree of standardization has taken place. For example, a successful policy package has been recently introduced, including the Law 3855/2010, which describes the context and principles of an EPC, provides a model contract and prescribes the allocation of obligations and responsibilities between the ESCO and the client[5], as well as the Ministerial Decision D6/13280/07.06.2011, which is almost completely consistent with the EU Code of Conduct for EPCs. To further enhance trust amongst the involved parties, the Ministry of Environment and Climate Change has already issued two EPC models, the shared savings model and the performance guaranteed model. In both cases, O&M agreements depend on the conventional agreed level of EE improvement and/or other agreed EE criteria, such as saving money.

One of the key barriers for clients to enter into EPCs has for a long time been a combination of lack of access to financing, the absence of flagship projects and the lack of quality assessment schemes. In particular, from the end-users' perspective, the complexity of the EPC concept and process along with the lack of trust and transparency and the high transaction costs, are often mentioned as major

[3] Usos Y Prácticas En Los Contratos De Ingeniería, Procura Y Construcción Oscar Cristofer Pinzón Téllez Artículo de investigación científica y tecnológica DOI: http://dx.doi.org/10.15425/redepriv.56.2016.01

[4] Operation & Maintenance Agreements Overview, https://globaltradefunding.com/project-finance/project-finance-documents/operation-maintenance-agreements/

[5] Bertoldi, P., &Boza-Kiss, B. (2017, August). Science Direct. Retrieved from Analysis of barriers and drivers for the development of the ESCO markets in Europe: https://www.sciencedirect.com/science/article/pii/S0301421517302483

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additional barriers, while ESCOs currently existing in Greece have no access to financing mainly due to their small size. Additionally, concerning financial actors, the lack of guarantees and equity, the little capacity to deal with the complexities of EPC projects and the small investment opportunities, make their involvement less attractive[6].

To overcome the aforementioned key barriers, trust amongst involved parties needs to be enhanced. With this premise, an updated regulatory framework to further support EPC market development along with the effective deployment of standardization and benchmarking methods accompanied by innovative business model are identified among the potential solutions to support interest in energy efficiency and unlock access to third-party financing.

## 3.2 IMPACT OF PRE-EXISTING TENANCY AGREEMENTS

For energy investment decisions and financing of such interventions in the private rental buildings, landlord-tenant relations become significant, and for such agreement models, all tenancy agreements, any linked clauses and exit scenarios should be considered in comprehensive way, highly focusing on the legislative side of the relations and agreement. In this regard, the landlord tenant amendment act and its scope brings out a better understanding of an agreement, therefore it can also be a base resource for the SmartSPIN contractual model definition as both the landlord and tenant are important stakeholders of a buildings' energy efficiency interventions.

Traditional leasing agreements often create a condition known as "split incentives" between owner and tenant, in which capital improvements that yield energy savings result in one party paying for improvements while the other party receives the benefits of reduced utility costs. Commonly, building owners pay for retrofits while tenants enjoy the decreased utility costs. This phenomenon is a major barrier to improvements in the energy efficiency sector, and it prohibits stakeholders from investing in energy saving retrofits. The commercial building owners that endure these market and regulatory challenges will do so by adapting quickly and extracting as much value as they possibly can from their assets. The value of energy efficiency – high return on investment, decreased operating costs, more marketable properties, increased environmental resiliency – is as well documented as the challenges to implementing it.

The split incentive, in which the building owner pays for upgrades, but the tenants pay the utility bills, thus reaping the rewards, is the most common commercial lease structure and has long stood in the way of deep energy retrofits in tenant-occupied commercial space. The problem with cracking the split incentive is that this lease structure is extremely beneficial to commercial landlords because it allows them to push much the building's operating risk onto their tenants. In a triple net (NNN) lease, most common among commercial tenants that occupy large footprints, the tenant pays for utilities, property taxes, maintenance and insurance in addition to rent. Rent for these leases is typically lower, but they're popular with landlords and investors because they produce steady, low-risk cash flows.

Other landscapes that can exist is one where the landlord pays utility bills. This can produce another barrier to promoting energy reduction amongst both parties. A further landscape creating complication is one where the landlord in attempting to limit tenancy rights offers a license agreement rather than a tenancy. A license is a 'mere permission' to use a premises and does not have the same strength as a lease legally.

Green lease is standard lease with additional clause for management and improvement in environmentally sustainable performance of building, such measures to be undertaken are agreed upon by both landlord and tenant. Such clauses include the extent of sustainable performance

[6]Botzios-Vaskalakis, A. (2018, February). QualitEE Project. Retrieved from Country Report On the Energy Efficiency Services Market and Quality: https://qualitee.eu/wp-content/uploads/QualitEE_2-04_CountryReport_EL_2018.pdf

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desired from the building and its usages. A green lease differs from a standard commercial lease by providing directions on how a structure is to be occupied, operated and managed in the most workable way possible.

### 3.2.1 IRELAND

As the Irish Green Building Council addresses the scope of private rental stock in Ireland, there are around 109,000 commercial buildings and most of these are retail or offices. Primary energy demand modellings indicate that the retail sector among all, has the highest energy demand, followed by offices, hotels and restaurants. Considering Ireland's commercial building stock, relatively basic upgrades can bring important levels of energy savings in buildings. In Ireland, since 2009, it has been mandatory to have energy rating for every rental or for sale of residential and commercial buildings. There are various investment support mechanisms for building owners, when they consider property energy efficiency improvements.[7]

According to the Deep Renovation of Traditional Buildings Report from the Sustainable Energy Authority of Ireland (SEAI), Irish legislative landscape and issues that can prevent energy retrofits in existing commercial buildings[8] are presented in Table 3.1. The list of matters appears as the main topic of discussion as potential barriers for energy related renovations in commercial buildings.

**Table 3-1 Irish Legislative Landscape and Issues that can prevent energy retrofits**

| Number | Legislative Landscape and Issues that can prevent energy retrofits |
|---|---|
| 1 | Split incentive problem/ conflict of interests |
| 2 | High pay back periods |
| 3 | Lack of motivation, information, awareness and trust on companies as well as on their retrofit solutions |
| 4 | Capital Constraint |
| 5 | High upfront cost and less lucrative financing schemes |
| 6 | Property condensation risk |
| 7 | Structural issues of existing buildings |
| 8 | Availability of Grants for retrofit work |
| 9 | Complexity of funding structures |
| 10 | Stress & disruption to life |
| 11 | Highly fragmented supply chain and lack of skilled labour |
| 12 | Institutional and regulatory deficiencies |

Under Part II of the Landlord and Tenant Amendment Act[9] (as amended), a business tenant may enjoy certain protection, including the right to remain in the premises as a tenant after the lease comes to an end. Further to ensure that the tenant does not seek to exercise any potential right, the landlord may request that the tenant execute a deed of renunciation. If the lease is to be executed for a period of at least 5 years, then it is highly advisable for the landlord to insist that a deed of renunciation is signed by the tenant. Otherwise, the tenant is entitled to demand a new tenancy at the end of the first tenancy.

**The Landlord and Tenant Act** has Part IV of Compensation, and its Article 45 indicates. "— For the purposes of sections 46 to 57, "improvement" in relation to a tenement means any addition to or alteration of the buildings comprised in the tenement and includes any structure erected on the tenement which is ancillary or subsidiary to those buildings and also includes the installation in the tenement of conduits for the supply of water, gas or electricity but does not include work consisting

[7] Irish Green Building Council, Overcoming the split incentive barrier in the private rental market, International Case Studies, February 2019

[8] https://www.heritagecouncil.ie/content/files/Deep_Energy_Renovation_of_Traditional_Buildings.pdf

[9] https://www.irishstatutebook.ie/eli/1980/act/10/enacted/en/html

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only of repairing, painting and decorating, or any of them."[10] The parties may agree to mutually renew the lease at the end of the rental period. It is also worth noting that by virtue of the Civil Law (Miscellaneous Provisions) Act 2008 all business tenants, regardless of user, may contract out of their entitlement to renew their tenancy, after five years. Therefore, the timing of the tenancy agreement could also be a factor in interventions.

Anyone selling or letting leasehold property must provide a Building Energy Rating (BER) (Energy performance certificate) to the buyer/tenant by law. This does not have any sanction unless an aggrieved party complains to the regulatory body, so a tenant should insist the BER is supplied. The BER will grade the property in terms of energy performance and make recommendations about how to improve that grade and performance. This has various implications for the tenant. Firstly, poorly performing units will cost more to run. Secondly, it has been mooted that in the future business rates may be linked to energy efficiency so that poor performing units will be pay higher rates. In addition, in future works may be compulsory to poor performing units to increase their efficiency. All these things will have a cost for the tenant.

There are currently no statutory requirements for contracts for sale, leases or agreements for lease to contain covenants to observe certain environmental or energy efficiency standards. However, there is a move towards "green leases" and reference to Leadership in Energy & Environmental Design (LEED) requirements in some commercial leases in Ireland, particularly where the leases are of new buildings or buildings which have been substantially refurbished. LEED is an international green building certification programme that recognizes best-in-class building strategies and practices in accordance with the guidelines of the US Green Building Council. Furthermore, a BER certificate and advisory report must be provided by either a vendor or landlord on the sale or letting of a premises (subject to certain exemptions). Traditional tenancy agreements have significantly been based on a commercial agreement to provide use of building space for an agreed sum of money. So there has never been consideration regarding landlord tenant collaboration to improve energy efficiency or building sustainability.

The landlord often has little motivation to disrupt rent role or contemplate investment during the tenancy. The tenant dependent on the lease length will only consider payback of energy interventions that fall well within lease/tenancy timeframe. There are many lease agreements varying on 'return to Shell', some are in the office sector CAT A fit outs others are CAT B and all of these scenarios present differing landscape when trying to guess landlord and tenant to act together. Many fields of tenancies, if they haven't fully considered optimal solutions at that stage will find moving forward/investment to achieve this will be difficult to get sanctioned.

### 3.2.2 SPAIN

In Spain a typical lease, called "The Lease Agreement" (*Contrato de Arrendamiento*) includes the following provisions[11]:

- Details for the identification of the landlord (*arrendador*) and tenant (*arrendatario*)
- Description and address of the property
- Contract duration
- Amount of rent and terms of payment
- Any other legal provisions that the parties agree
- Detail of expenses associated to the property and the party responsible for them
- Terms for late payments
- Terms for subletting the property

[10] https://www.irishstatutebook.ie/eli/1980/act/10/section/45/enacted/en/html#sec45

[11] https://www.angloinfo.com/how-to/spain/housing/renting-accommodation/lease-agreement

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- Jurisdiction

The clauses related to energy consumption such as payment of the energy bills, are part of the clauses on the expenses associated to the property. A notary can assist with the preparation of the rental contract and with its recording at the Spanish Property Registry (Registro de la Propiedad). If the purpose of the lease is other than a residential building (offices, commercial premises, etc.), there is no legal obligation for the tenant to assume electricity, water, and heating costs. The amount to be paid must be determined by the lease contract.

Leases for residential purpose as well as for other purposes like offices, commercial premises, etc. are regulated by the Spanish Law 29/1994 on Leased property[12]. In the residential sector, landlords have the right to perform construction works to install energy efficiency measures in a building, possibly also going against the will of the tenant, in case the works cannot be postponed after the termination of the lease contract. The tenant has the right to terminate the lease contract if the measures have a substantial impact on the living in the dwelling. A tenant can endure the works and obtain a reduction of the rent proportional to the part of the building which has been affected by the works. In other typologies of buildings, such as offices and commercial premises, the rules for residential leases are normally followed even though different rules can be agreed in the lease contract. The landlord and the tenant may agree in the lease contract that the landlord cannot install any energy efficiency measures. The landlord has generally the right to raise the rent to receive a reimbursement of the costs for the energy efficiency measures implemented in the leased property within reasonable limits unless a different agreement is in place in the lease contract. Commercial properties follow the same rules of residential ones unless different rules have been established in the lease contract.

In Spain, all the landlords of rented buildings must provide Energy Performance Certificate to the tenant irrespective of length of tenancy. Owner of the building is responsible for obtaining Energy Performance Certificate for their building. In terms of incentives, the regions and municipalities have measures intended to promote energy efficiency in buildings.[13] The legislative limitations in Spain are related to the lack of standards related to sustainability, which should prescribe specific building materials, energy efficiency, waste management, etc. Therefore, there are no regulations prescribing sustainability requirements in lease agreements. However, allocation of costs and incentives for improvement of buildings' sustainability can be regulated with a contractual clause.

### 3.2.3 GREECE

Provisions relating to the energy efficiency of buildings are not commonly included in leases. Under the Greek Civil Code[14], leasing agreements in Greece involve private law contract, agreed between two parties, the landlord and the tenant. Utility expenses are traditionally paid by the tenant.

In general, Greek law on leasing agreements provides that the landlord:

- rents its property for its agreed use, without flaws or deficiencies, for the length of the agreed rental period,
- keeps the property in suitable condition for its agreed use and perform any necessary repairs/maintenance work,
- agrees that by law, any taxes or charges resulting from the lease are the landlord's responsibility.

On the other hand, the tenant agrees to:

[12] https://cms.law/en/int/expert-guides/cms-expert-guide-to-green-lease-clauses-in-europe/spain

[13] https://uk.practicallaw.thomsonreuters.com/9-503-3133?transitionType=Default&contextData=(sc.Default)&firstPage=true

[14] Law 1703/1987 – (FEK 78/A/27-5-1987) available online: https://www.e-nomothesia.gr/kat-epikheireseis/n-1703-1987.html

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- pay the rent in full by the agreed date. If there are delays in rental payments, the landlord can start procedures to evict the tenant,
- keep the property in good condition.
- use the property only for its agreed purpose.

## 3.3 IMPACT OF EQUIPMENT WARRANTIES AND TECHNICAL REQUIREMENTS ON DEMAND RESPONSE

According to the International Energy Agency Demand Response Tracking Report 2020, demand-side flexibility becomes more important as countries adopt more ambitious climate targets. Promising action has been taken worldwide to either promote the use of demand-side response to provide flexibility or improve existing programs. Legislation is evolving, but regulatory progress and policy support need to advance more quickly. Buildings are a potential source of flexibility. They should become more energy-efficient and be equipped with smart control and automation systems that can allow them to interact with the grid while effectively managing loads and distributed energy resources, including rooftop solar PV and battery storage. In the IEA Net Zero Emissions by 2050 Scenario, mandatory zero-carbon-ready building energy codes that include requirements for demand flexibility and smart controls are introduced for all new buildings in all regions by 2030, and retrofits of existing buildings should happen at an average pace of 20 million dwellings per year to 2030. The European Union has already adopted roadmaps towards this goal included in Renovation Wave.[15]

The demand response (DR) program is one of the most promising components in the development of the Smart Grid. However, there are many challenges in practical operation to improve the existing and outdated system to comply with the DR programs. The major pain point of the office building owner in the DR program is the additional equipment, modification and operation cost of the existing equipment.
While addressing the demand response on one side, an uninterrupted availability of energy has to be ensured via the infrastructure and system's capabilities for the overall energy security on the other side. This uninterrupted availability requires the equipment health, preventing damages and disturbances. So, a balanced approach of systems has to be optimized while managing and controlling complex energy infrastructure. The activities for equipment management in the grid for demand response might vary according to the legacy and smartness level of the infrastructure. There are several layers of monitoring and controlling for the equipment. While it is feasible to use smart plugs and remote on/off actions for some site equipment, it is entirely programmable for various scenarios of operations

Regarding the equipment management and system health, simple yet cost-effective hardware and software solutions are proposed for such as targeting an outdated air-conditioning system without voiding the warranty of the outdated equipment and without installing any additional measurements. The interior equipment of some buildings' i.e. air conditioners (ACs) cannot be modified due to this voiding their warranty. That is, only external equipment can be installed to control the ACs. This poses challenges for implementing an automated DR system. Therefore, it is important to design an effective, simple, yet low-cost solution to popularize DR-capable buildings.[16]

### 3.3.1 IRELAND

To ensure the network has sufficient supply to meet demand the new Demand Side Units (DSU) and Demand Response scheme has been set up which allows large energy consumers in Northern and Southern Ireland to earn revenue by having the ability to temporarily reduce their electricity demand on the Grid. In May 2011, the regulators in both Ireland and Northern Ireland published their "Demand Side Vision for 2020" in which they stated that they "recognize the potential which demand side

[15] IEA Demand Response Tracking Report 2020, retrieved from https://www.iea.org/reports/demand-response

[16] A Demand Response Implementation with Building Energy Management System, Charoen et al., 2022, retrieved from https://www.mdpi.com/journal/energies

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management has to deliver significant economic and environmental benefits to the All-Island market". DSUs are seen as one of the key vehicles to enable a market-based approach to demand side management. Since the publication of the "Demand Side Vision for 2020" many but not all of the barriers to market entry have been removed and demand side participation has been promoted throughout the country.

In Ireland, in addition to customers individually participating in the schemes operated by EirGrid, medium to large electricity users can participate in a Demand Side Unit (DSU) or Aggregated Generating Unit (AGU). A Demand Side Unit consists of one or more demand sites that can reduce their demand when instructed by EirGrid or SONI. The Demand Side Unit has one hour to reduce its demand and must be capable of maintaining the demand reduction for at least two hours. Suitable non-critical equipment may include air conditioning, ventilation, electric heating, water chillers, fans, pumps, and other interruptible loads. The grid operator in Ireland requires real-time communications with the DSU to ensure secure power system operation and to issue dispatch instructions to balance generation and demand. A signal list is provided to the DSU when their application is finalized, so that the DSU can configure their control system to provide these signals. Manufacturers are releasing equipment for the smart grid endowed with communication protocols such as DNP3, IEC 61850, and MODBUS. However, there are legacy equipment operating in the electricity distribution network that cannot communicate using any of these protocols.[17]

In Ireland since late 2021, the increasing calls or demand response events for businesses enrolled in these schemes is causing due to operation disruption some participants to 'opt out'. Businesses are finding that in addition to the power loss/reduction – those other peripheral controls and electronics are disrupted and sometimes require manual reset or a service callout, which is negating demand response revenue benefit.

### 3.3.2 SPAIN

In Spain, there is only one scheme allowing Explicit Demand Response: the Interruptible Load programme for large industrial customers managed by the TSO Red Eléctrica de España[18]. This programme does not permit aggregation and only applies to large industrial consumers which are connected to the high voltage network. The industrial customers who can participate in this demand response programme are: construction industries (steel, concrete, glass, etc.), other material factories (paper, chemistry, etc.) and desalinization plants (in the Canary Islands). They provide 2.000 MW capacity of demand reduction in peak hours.

The ICT technology required to participate to the Interruptible Load programme is already available; the participants have an ICT system directly connected to the TSO. In this respect, given an event duration of some hours, the acceptable delay in the response can be up to few minutes. The customers need to send their consumption's forecast to the TSO monthly for the next two months. There is no evidence that the demand response events may affect warranties of equipment installed at the premises of the large industrial customers of the TSO.

### 3.3.3 GREECE

Currently Greece has been in process of opening markets for DR, however both ADMIE's (Independent Power Transmission Operator) Balancing Market Rulebook [19] and the existing

[17] Infrastructure for Integration of Legacy Electrical Equipment into a Smart-Grid Using Wireless Sensor Networks, Araujo et al., MDPI Sensors (2018)

[18] Bertoldi, P., Zancanella, P., & Boza-Kiss, B. (2016). Demand response status in EU member states. EUR 27998 EN, 1-140, https://publications.jrc.ec.europa.eu/repository/handle/JRC101191

[19] Balancing Market Rulebook; Independent Power Transmission Operator: Athens, Greece, 2020. Available online: https://www.admie.gr/en/market/regulatory-framework/balancing-market-rule-book (accessed on 15 February 2021).

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regulatory framework introduce some obstacles regarding the consumer size in balancing services provision, and the energy storage licensing and operation[20], respectively. As a matter of fact, under the Law 4203/2013/2015 (Article 17)[21] and Hellenic Distribution Network Code[22] Greece has established an auction-based compensation scheme, which allows energy consumers to be financially compensated for voluntarily reducing their consumption when the security electricity supply is at risk. In practice, this scenario depends on "Demand Control Contract" between the Greek DSO (HEDNO) and large to medium energy consumers located at congested network areas.

According to the relevant provisions, the Greek DSO is legally allowed to set limits or temporarily reduce or interrupt the electricity supply to the contracted parties, at its own initiative and upon previous notification, for the conventionally predefined periods or circumstances. The contracted consumers are offered a fixed compensation via 3-monthly auctions in exchange for the possible load reductions.

In parallel, medium and low energy consumers can also opt for "Demand Control Contracts", under the premise of keeping track of and monitoring their real-time energy flows via their individual metering equipment. Nevertheless, demand response for medium and low energy consumers faces challenges due to the lack of the appropriate infrastructure, like smart metering equipment, which is still in its preliminary deployment phase[23], from all the involved parties (TSO, DSO, and individual consumers).

## 3.4 Impact of GDPR And Data Protection on Smart Metering

GDPR, The General Data Protection Regulation Act is a law that was introduced to protect the **Personal Data** of citizens of the EU. **"Personal data"** is any information that relates to a recognized or recognizable **living individual** (data subject) such as a name, email address, tax ID number, online identifier, etc. "Processing" data includes actions such as collecting, recording, storing, and reassigning data. Further **Data protection law designed and applied to businesses across Europe, and beyond.** The law goals to secure the environment and benefit both the citizens and businesses in the European Union. In order to ensure the enforcement of the regulation, the enforcement board has imposed heavy fines and penalties for non-compliance to GDPR Regulation.

GDPR is a law, designed to unify data protection laws across all member states of the European Union (EU), Ireland, Lichtenstein, Norway, and Switzerland, and give users more rights and control over how their data is processed. It is a legal framework that sets strategies for the collection and processing of personal data from individuals. Using smart meters will also allow consumers to keep track of costs and, by combining information on a building or location basis, allow operators to plan the supply of electricity more effectively. However, the collection of statistics, and the sharing and

[20]FEK B' 5619/21 (December 2020). Available online: efaidnbmnnnibpcajpcglclefindmkaj/viewer.html?pdfurl=https%3A%2F%2Fypen.gov.gr%2Fwp-content%2Fuploads%2F2021%2F07%2FEisigisi_ODE_Apothikeysis-xwris-FEK-kai-praktika.pdf&clen=7788211&chunk=true

[21]FEK 2861/28.12.2015, Interruptibility Services, Type and Content of interruptibility contracts, according to the provisions of Article 17 of Law 4203/2013. 2015. Available online: https://helapco.gr/wp-content/uploads/Diakopsimotita_FEK.pdf
(accessed on 21 February 2021).

[22]RAE Decision. 395/2016, Hellenic Distribution Network Code, Government Gazette, FEK 78 / B/ 20-1-2017, 20 January 2017. Available online: https://www.e-nomothesia.gr/energeia/apophase-raearithm-3952016-phek-78b20-1-2017.html (accessed on 17 February 2021).

[23]Leal-Arcas, R.; Akondo, N.; Rios, J.A. Energy decentralization in the European Union. Georget. Environ. Law Rev. 2019, 32, 2019. Available online: https://www.academia.edu/38353622/Energy_decentralization_in_the_EU

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transfer between devices and networks of this data, raises both privacy and security concerns. Individuals need to be properly educated as to how their energy consumption information will be used. Consumption data must be acceptable, relevant, and not excessive in relation to the purposes for which it is being used. Text or conditions in consumer contracts need to be clear and transparent about who data is to be shared with.

The General Data Protection Regulation (GDPR) applies from 25 May 2018. It has general application to the processing of personal data in the EU, setting out more extensive obligations on data controllers and processors, and providing strengthened protections for data subjects. With the GDPR, several rights have been considerably strengthened – individuals will have greater power to demand companies to reveal or delete personal data being held; regulators will be able to work in concert across the EU for the first time on this issue as opposed to having to launch separate actions in each jurisdiction, and with far more punitive consequences. Given that energy companies are increasingly becoming data companies, harnessing energy data and personal data as a tool for energy efficiency mechanisms, the impact on the energy sector will be wide-ranging.[24] The rollout of 'smart metering systems' across Europe enables collection of electricity consumption in every household, that can be personal data. Developing such technology in a world where everybody was speaking of data protection and the famous General Data Protection Regulation (GDPR) raises some questions. In that respect the European Commission has set up a Smart Grids Task Force, consisting of five Experts Groups focusing on different specific areas. One of those, Expert Group 2, is in charge of mitigating the risk on privacy and security of smart metering systems.

Together with the Commission, Expert Group 2 developed a template for carrying out a Data Protection Impact Assessment (DPIA). The GDPR requires that "*where a type of processing in particular using new technologies, (…) is likely to result in a high risk to the rights and freedoms of natural persons, the controller shall, prior to the processing, carry out an assessment of the impact of the envisaged processing operations on the protection of personal data*". In 2017, the WP29 adopted Guidelines, in order to clarify where a DPIA should be undertaken. The Guidelines set up a list of nine criteria, the more criteria the processing meets, the more likely it is to present a high risk to data subjects and therefore to require a DPIA. The WP29 suggests that having two out of nine criteria is the trigger to conduct a DPIA. Regarding the specific topic of smart meters, at least three seem applicable: Evaluation or scoring, including profiling and predicting; data processed on a large-scale and; innovative use/application of new technological or organizational solutions.[25]

The European Commission proposed to adapt the Electricity Directive in order to include in the text some provisions regarding data protection issues specific to smart meters.[26] The Joint Research Centre of the European Commission is currently working on defining the Data Information exchange principles from smart appliances. For this it has been planning to co-design a Code of Conduct on Interoperability requirements of smart appliances.[27]

### 3.4.1 IRELAND

In Ireland, smart metering is a key modern-day topic, with the National Smart Metering Programme commencing with deployment into domestic residences. Smart meters facilitate increased data collection – in particular, it will now be possible for both the user and energy company to screen usage data at more regular intervals, including down to the hour, quarter of an hour, and more – a significant increase from the currently estimated readings every 2 months, and physical reads every

[24] FSR EUI The GDPR and the Energy Sector, available on https://fsr.eui.eu/the-gdpr-and-the-energy-sector/

[25] https://gdpr.be/uncategorized/smart-energy-gdpr-utility/

[26] https://eur-lex.europa.eu/resource.html?uri=cellar:c7e47f46-faa4-11e6-8a35-01aa75ed71a1.0014.02/DOC_1&format=PDF

[27] https://ses.jrc.ec.europa.eu/development-of-policy-proposals-for-energy-smart-appliances

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quarter. Among these benefits, smart meters will enable electricity to be priced in accordance with request – so during peak times energy is most expensive – which in theory would decrease spikes in usage and result in a lower need for peak capacity, increasing the efficiency and maintenance of the energy supply. Although the GDPR is directly applicable as a law in all Member States, it allows for certain issues to be given further effect in national law. In Ireland, the national law, which, amongst other things, gives further effect to the GDPR, is the Data Protection Act 2018. The Law Enforcement Directive is transposed into Irish law by the Data Protection Act 2018, in Part 5 and Part 6 of that Act.

The Data Protection Act 2018, which became law on 25 May 2018 established a new Data Protection Commission (DPC). The new Commission is the national independent supervisory authority in Ireland with responsibility for upholding the fundamental right of the individual to have their personal data protected. The DPC's statutory powers, functions and duties derive from the Data Protection Act 2018, General Data Protection Regulation, Law Enforcement Directive, as well as from the Data Protection Acts 1988 to 2003 which, inter alia, gives effect to Council of Europe Convention 108. Using its statutory powers, the Data Protection Commission examines complaints from individuals in relation to potential infringements of data protection law.

According to the Commission for Regulation of Utilities (CRU), by the end of 2024, every home and business in Ireland will have a smart meter. *"Your smart meter will collect data on your electricity use every 30 minutes... This data will only be read by your supplier if you have given them permission and asked to use a smart service. If you choose to switch to a Time of Use tariff, your supplier will let you know what data will be collected. Every day, ESB Networks will collect data from your smart meter. This will state the amount of electricity used over the last 24-hours. This data will inform billing and support customers switching suppliers or moving premises. ESB Networks will also collect data about the meter itself. They will store all data in a central Meter Data Management System. They commit to complying with GDPR and making sure all personal data is safe and secure."*[28]

As defined on their privacy statement, the state-owned TSO, EirGrid Group is regulated by the Commission for Energy Regulation. EirGrid is a statutory company established pursuant to the European Communities (Internal market in Electricity) Regulation 2000 (SI 445/2000) and the designated Transmission System Operator for Ireland. Pursuant to the Electricity Act 1999 (as amended), EirGrid is licensed under a transmission system operator license ("TSO License") to carry out the role and functions of the Transmission System Operator.[29] As a utility operating in the Republic of Ireland, Bord Gais Energy shares their Code of Practice on Electricity Smart Meters, Privacy Notices for their energy customers including gas & electricity supply, electrical vehicle charger or other types of services.

### 3.4.2 SPAIN

The Organic Law 3/2018, of December 5 on the Protection of Personal Data and the Guarantee of Digital Rights was published on the Official Gazette of Spain. The Law adapts the Spanish legal system to the General Data Protection Regulation and provides additional specifications or restrictions of GDPR rules[30].

The Law states that the fundamental right to data protection of natural persons under the Article 18.4 of the Spanish Constitution, shall be guaranteed under the GDPR and this law.

- The law determines that requests of data access in relation to the Article 12(5) of the GDPR from a data subject are to be considered excessive because of their repetitive character when submitted "more than once during a period of six months, unless there is a legitimate reason."
- The law addresses the protection of privacy in the workplace, such as the right to privacy and use of digital devices (Article 87), the right to digital disconnection (Article 87), the right to privacy against the use of video surveillance devices and sound recording (Article 89), the

[28] https://www.cru.ie/home/smart-meters/
[29] EIRGRID GROUP PRIVACY STATEMENT, https://www.eirgridgroup.com/privacy_statement/
[30] https://iapp.org/news/a/spains-new-data-protection-law-more-than-just-gdpr-implementation/

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right of privacy against the use of geolocation systems (Article 90) or the digital rights in collective bargaining (Article 91).

- In relation to the privacy in the workplace, the Article 86.2 of the Law states that the employer may have access to the content obtained from the digital devices provided to employees only to control compliance with labor or statutory obligations and to ensure the integrity of these devices.

As with all mass data collection, smart meters raise concerns around data minimization and confidentiality intrusion. The NSMP is mandatory under Irish law (Statutory Instrument 426 of 2014) to meet privacy standards applicable under the General Data Protection Regulation (Regulation 2016/679) (GDPR). Firstly, there is the issue of the legality of the data collection in the first place. "***In July, the Spanish Supreme Court ruled that information collected on energy usage, in addition to the corollary meter serial number to which the information is attributed, constituted personal data."*** This is an tactic that has been mirrored by the Information Commissioner's Office (ICO), in the UK, which considers consumption information composed by meters, when linked with the meter serial numbers/MPANs, as personal information, and the Irish Data Protection Commission has taken a similar line.[31] The application of the GDPR to smart metering data is also foreseen by Article 23 of the Electricity Directive (Directive 2019/944).

### 3.4.3 GREECE

Law No. 4624/2019 on the Personal Data Protection Authority, Implementing the General Data Protection Regulation (Regulation (EU) 2016/679) and Transposing into National Law Data Protection Directive with Respect to Law Enforcement (Directive (EU) 2016/680) and Other Provisions ('the Data Protection Law'), which implements certain provisions of the GDPR, is the basic national legal framework on personal data protection in Greece along with the GDPR.[32]

Apart from the Data Protection Law, Law 3471/2006 on the protection of personal data and privacy in the electronic communications sector ('the Electronic Communications Law'), as in force, incorporates the Directive on Privacy and Electronic Communications (2002/58/EC) (as amended) ('the e-Privacy Directive') and provides specific rules on the protection of personal data in the field of electronic communications.[33]

## 3.5 ENERGY COMMUNITIES AND P2P TRADING

Regarding the energy communities, renewable energy communities and citizen energy communities are considered, enabling the active participation of consumer, producer, and prosumers within the grid. The EU has introduced the community concept in the legislations through the Clean Energy for all European package. The Directive on common rules for the internal electricity market and the revised Renewable energy directive both aim to improve the role of renewables and communities through flexibility services.

Community energy may be a broad term that describes citizen and native power and participation in renewable energy generation, distribution, and effectiveness. It's about embracing the advantages of energy resources and utilizing the dynamics within the communities and creating social, economic,

[31] https://lawofthehorse.org/2020/01/10/privacy-and-security-challenges-with-the-irish-smart-metering-roll-out/#_ftn4

[32] An official translation is available online: efaidnbmnnnibpcajpcglclefindmkaj/viewer.html?pdfurl=https%3A%2F%2Fwww.dpa.gr%2Fsites%2Fdefault%2Ffiles%2F2020-08%2FLAW%25204624_2019_EN_TRANSLATED%2520BY%2520THE%2520HDPA.PDF&clen=749187&chunk=true

[33] An official translation is available online: efaidnbmnnnibpcajpcglclefindmkaj/viewer.html?pdfurl=https%3A%2F%2Fwww.dpa.gr%2Fsites%2Fdefault%2Ffiles%2F2019-10%2Flaw_3471_06en.pdf&clen=137459&chunk=true

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and environmental benefits for its citizens and the society. A prosumer / renewables self-user is a final energy user within the energy communities who generates renewable electricity for its own consumption, and who may store or vend tone-generated renewable electricity, as long as, for a non-household renewables tone-consumer, that conditioning is not its primary marketable or professional exertion.

Communities all over Europe are creating systems where they are laboriously involved in running energy resources. This could be a wind ranch, solar panels on the roofs, or a biomass-fed heating system. Energy communities organize and accelerate citizen-driven clean energy transition, and further could benefit citizens and energy investments, providing flexibility to the electricity systems. Energy communities also enable and accelerate peer to peer trading models between end-users and/or prosumers.

### 3.5.1 IRELAND

In Ireland, there is a little but growing assiduity of community and transition energy groups. Unfortunately, there are significant walls that hamper the success of those groups and systems, and as a result, community-led or community-possessed renewable energy in Ireland represents only a small bit of overall energy generation and eventuality. According to the Irish Central Statistical Office in 2016, no frame for collaborative tone-consumption in multi-tenant structures exists yet as 97 of domestic structures are single residences in Ireland. Still, different types of interlinked generalities are developed that relate to, among others, original renewable energy generation. RECs are part of these generalities. A new Renewable Electricity Support Scheme (RESS) was espoused in 2020 (Irish Government 2020). Within the RESS, so-called community-led systems are introduced which admit special boons for renewable generation. There are no public support structures for community groups to help with the original design development stages.

Energy Sharing P2P Trading in Ireland: Trading grounded on P2P models makes renewable energy more accessible empowers consumers and allows them to make better use of their energy coffers. The description of P2P trading by the EU legislation could raise two legal challenges: Originally the description of peer-to-peer trading addresses veritably generally about request actors as peers. At first sight, the EU description might disaccord with the bulk opinion within the literature, limiting P2P trading to the new vertical contractual relationship between prosumers and consumers. By not confining the description of P2P trading to trading between non-professional request actors, request actors involved in a business-to-consumer sale via platforms could claim benefits entitled to peer-to-peer trading. Secondly, P2P trading must abide by a contract with pre-determined conditions governing the automated prosecution and agreement of the sale. Some authors see this as substantiation that the legislation wanted to encompass trading models are associated primarily with ultramodern information technologies, similar to block chain. Block chain has a high eventuality for automatization due to so-called smart, tone-governing contracts, making the use of a digital platform a demand in practice. On the negative side, the description of P2P trading as similar could count energy exchange platforms that don't use pre-determined conditions governing the sale's robotic prosecution and agreement from possible nonsupervisory benefits – like platforms that are not supported automated prosecution.

Several P2P business models have a disintermediated setup and calculate on block chain technology for keeping track of deals. Block chain operations face issues relating to data sequestration laws, particularly if they're public-facing. This is because European law subventions data subjects the proper to pierce their particular data and thus the applicable information concerning processing, the proper to amend any inaccurate data, and thus the right to retain particular data cancelled (generally appertained to as the right to be forgotten). However, which surely seems to have been the intention of the European lawgivers, the use of block chain technology in the platform frugality would be all but insolvable, if the GDPR were to be applied rigorously.

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### 3.5.2 SPAIN

Spain hasn't had a legislation favorable to the development of energy communities, there have been retro-active changes to support schemes which hampered the development of renewables and since 2011 the so-called sun-tax, a taxation applied to the energy which citizens produced using solar panels installed on their own roofs. The sun-tax disappeared in 2019, but Spain still needs a clear transposition in national law of the REDII-directive, as well as a national information campaign which can help citizens and communities to develop awareness of their rights under EU law.

Despite the lack of a clear regulatory framework, there are in Spain two great examples of energy communities such as Som Energia and La Corriente. The former was founded by 150 citizens in 2010 and counted nearly 68.000 members in 2020, with an investment of a total of €15,000,000 in the project by six thousand members. Som Energia is now a self-funded community after the Spanish government stopped the financial support. According to this community model, the consumers supplied by Som Energia are co-owners of the cooperative and are allowed to participate in its governance. They can also become investors in renewable energy. La Corriente is a citizen-led renewable energy cooperative in Madrid established in 2015 which counted almost 500 members in 2020. The founders of the cooperative aimed at creating a 100% renewable and widely participatory electricity community in Madrid area, empowering citizens through knowledge sharing and delivering an environmentally friendly energy model.

In Spain, the development of energy communities is hindered by the large oligopoly market model. In fact, the market is dominated by the big energy incumbents such as Iberdrola, Endesa, Naturgy, EDP España and Repsol. These companies will be driving the energy transition in Spain in place of communities and citizens in case the policymaker will not deliver an adequate regulatory system. Grid operators will have to grant other players such as prosumers the access to the infrastructure, with favorable prices for use. The legislation needed in Spain should enable the new actors of the P2P trading to achieve the new behaviors freedom and the opportunities to develop.
The European Union recognized the concept of energy communities based on peer-to-peer distribution in the Clean Energy Package and their development could be widespread in the energy markets of the future. After the P2P communities have been given a legal framework at EU level, the EU member states such as Spain should follow-up with a thorough national legislation to promote the undertake of the new technology solutions and the development of national markets[34].

### 3.5.3 GREECE

In 2018 Greece issued Law 4513/2018[35] introducing a new business model that will facilitate the transition to renewable energy sources with the active participation of local actors, while tackling the energy poverty and promoting energy sustainability and security. To this end, the Greek legislator promotes the "energy communities" defined as "*urban partnerships, with the aim of social and solidarity economy, and innovation in the energy sector* […] *through their activity in the fields of Renewable Energy Sources (RES), efficient cogeneration of electricity and heat, the rational use of energy, energy efficiency, sustainable transport, demand-side management, energy distribution and supply"* (Ar. 1.1, L. 4513/2018). Overall, the objective of the Law is to enable citizens at local and regional level to set-up and participate in energy cooperative projects and be actively engaged in the country's energy transition[36].

More specifically, energy communities are supposed to:

- reduce energy poverty,

[34] Peer-to-Peer, Energy Communities, Legal Definitions & Access to Markets (eui.eu)

[35] Law 4513/2018. Available on: https://www.e-nomothesia.gr/energeia/nomos-4513-2018-fek-9a-23-1-2018.html

[36] Douvitsa I. (2018). The new law on energy communities in Greece. CES (Cooperativisimo e Economia Social), Núm. 40 (2017-2018), Pages 31-58, ISSN: 1130-2682 at: revistas.webs.uvigo.es/index.php/CES/article/view/1385/1367

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- promote energy sustainability, production, storage, energy self-consumption, energy distribution and supply, self-sufficiency and security in island municipalities,
- support the efficiency in end-use at local and regional level, cogeneration, energy efficiency, sustainable transport, and demand-side management.

Under the same provisions, the key activities that an energy community can undertake are:

- distribution of electricity,
- natural gas heating/cooling within the region where its headquarter is located,
- demand management to reduce the final use of electricity,
- representation of producers and consumers in the electricity market,
- network development,
- management and exploitation of alternative fuel infrastructure,
- installation and operation of desalination plants using renewable energy,
- provision of energy services.

The Law 4513/2018 distinguishes between two types of energy communities:

- non-profit cooperatives, in which surpluses remain in the energy community in the form of reserves and are distributed for their purposes by decision of the general assemble,
- for-profit cooperatives, in which surpluses are distributed to their members under certain conditions and after deduction of the regular reserve.

## 3.6 SUB-METERING OF TENANTS

A smart metering system is an electronic system capable of measuring electricity fed into the grid, or electricity consumed from the grid, providing more information than conventional meters. Such system is capable of transmitting and receiving data for information, monitoring and control purpose, using a form of electronic communication and comes with a range of benefits for the energy system and its users. To deliver on all these fronts, smart meters must be equipped with the right functionalities, as given in the Electricity Directive (EU) 2019/944.

A study from December 2019 on the deployment of smart meters in the EU found that: [37]

- close to 225 million smart meters for electricity and 51 million for gas will be rolled out in the EU by 2024. This represents a potential investment of €47 billion
- by 2024, it is expected that almost 77% of European consumers will have a smart meter for electricity. About 44% will have one for gas
- the cost of installing a smart meter in the EU is on average between €180 and €200
- on average, smart meters provide savings of €230 for gas and €270 for electricity per metering point (distributed amongst consumers, suppliers, distribution system operators, etc.) as well as an average energy saving of at least 2% and as high as 10% based on data coming from pilot projects.

### 3.6.1 IRELAND

Sub-metering has no special legislation in general, it evolves from the need to use. Electricity regulation Acts 1999, allows anyone and everyone the usage of electricity as one requires. It uses the term ‘Customer’, which can be anyone. In Ireland, smart metering is a key contemporary topic, with the National Smart Metering Programme (NSMP) commencing with deployment into domestic residences late in 2019. ESB networks announced that, starting in September 2019, it would roll-out 20,000 meters in selected locations in Ireland, with a further 250,000 in place by the end of 2020 and a further 500,000 by 2024. However, this has since been delayed to 2025, due to the outbreak of COVID-19, which has resulted delay in physical installations.

[37] Benchmarking smart metering deployment in the EU-28

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### 3.6.2 SPAIN

Spain has transposed the requirements of the European Energy Efficiency Directive (Directive 2012/27/EU) on individual metering in multi-apartment and multi-purpose buildings into a national Law. The European Directive requires the installation of individual meters for heating, cooling and domestic hot water for all multi-apartment and multi-purpose buildings where these services are supplied from a common means, such as a common boiler. If technically feasible and cost effective, the individual metering is prescribed by the EU Directive to all existing buildings. However, the Spanish national law has imposed this requirement only to buildings built after the 2007.

Furthermore, the European Directive requires to use the heat cost allocators mounted on each radiator in all the buildings where heat meters are not a technically feasible or cost-effective solution for space heating. Also, this requirement has not been properly transposed in the Spanish national law. In 2019 Spain was referred by the Commission to Court in relation to the issues of heat and hot water metering in multi-apartment buildings[38].

### 3.6.3 GREECE

Greece is proceeding to a rollout of electricity smart meters, which has laid to the adoption of Law 3855/2010, the foundation of the national deployment strategy. In short, under Article 15, Law 3855/2010 foresees the provision of individual meters, currently to consumers of medium to low voltage connections, in each new connection or replacement, defining the minimum functional standards and the installation and communication arrangements between final consumers and the distribution companies, while is efficiently dealing with the electricity theft and fraud detection issues[39].

Although there is no legal framework that guarantees a mandatory reading of customers' meter, Law 3855/2010 requires additional information to the final consumers, such as actual consumption and actual energy prices, foreseeing that the energy supply companies are responsible for:

- installing personal meters that represent the actual consumption,
- giving information on the actual use duration, when this is economically reasonable and analogous to the potential for energy saving,
- supplying individual meters to any new connection of new or refurbished buildings,
- replacing existing old meters and to any connection taking place during grid construction or refurbishing projects.

Moreover, Law 3855/2010 foresees that energy bills should include data on the actual energy consumption and the respective energy price, as well as comparative yearly assessment of the customer's energy consumption. Currently, in Greece all medium voltage (MV) individual meters have been replaced with electronic meters (approximately 8,000 electricity customers), while a full scale replacement rollout as well as the activation of Automatic Meter Reading capability is still under planning and a final schedule has not been announced yet.[40]

[38] Commission refers Spain to Court for heat and hot water metering in multi-apartment buildings (europa.eu)

[39] ERGEG (2009). Status Review on Regulatory Aspects of Smart Metering (Electricity and Gas) as of May 2009, European Regulators' Group for Electricity and Gas, 19 October 2009, Brussels.

[40] European Commission DG Energy (2019). European smart meteringbenchmark: efaidnbmnnnibpcajpcglclefindmkaj/viewer.html?pdfurl=https%3A%2F%2Fwww.vert.lt%2FSiteAssets%2Fteises-aktai%2FEU28%2520Smart%2520Metering%2520Benchmark%2520Revised%2520Final%2520Report.pdf&clen=5102494&chunk=true

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# 4 CONCLUSION

The SmartSPIN project aims at unleashing the full potential of the commercial rented sector by implementing new business model for improving the energy efficiency and flexibility. The main goal of this report is to outline the steps followed to ensure ethical compliance when engaging with different stakeholders for online surveys and individual interviews. Eu Legislative Documents, Local Legislation (Ireland, Greece, Spain), Review of Existing Contractual Documents, meetings with the Advisory Board Members are taken into consideration.

Throughout this task and the report, while addressing the split incentive issue and energy efficiency measures and legal aspects, the literature review has been conducted on the issue studied in other research development projects, the impact of the existing O&M contracts, the impact of pre-existing tenancy agreements, the impact of equipment warranties and technical requirements for demand response, the impact of GDPR and data protection on smart metering, the situation and plans on energy communities and P2P trading and the situation and plans on sub-metering of the tenants has been discussed. It is found through international case studies that where the initiatives are introduced, the stakeholders are more willing to contribute and participate in the energy efficiency interventions and investments for the building energy systems retrofits. Voluntary and mandatory schemes are brought by various levels of nations and the union, so the directives and regulations are paving the way, and strong case studies and success stories are having a positive impact on accelerating the transition of the general stock. Considering the regulations, incentives and applications, the markets are developing and it is expected to see an accelerated growth in the markets to address such issues, according to the plans and scenarios of 2030 and 2050.

For the SmartSPIN project, the contractual service model definition shall consider all legal aspects and bring out the most optimized model in all legal, financial, technical and business aspects. Further analyses on existing solutions and recommendations to address the split incentive issue will be conducted and reported under the following tasks of the project, collecting feedbacks from the stakeholders, such solutions to be explored include green leasing, on-bill financing and agreement alterations.

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