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Combating Rising Energy Poverty with Sunnah-Compliant Orthodox Sukuk Finance

Abdullahi Ahmed Umar [1,*], Kabiru Goje [2] and Mahadi Ahmad [3]

[1] Department of Civil Engineering & Quantity Surveying, Military Technological College, Muscat 111, Oman
[2] Foundations of Religion Department, College of Sharia and Islamic Studies, University of Sharjah, Sharjah 27272, United Arab Emirates; kgoje@sharjah.ac.ae
[3] ISRA Research Management Centre (RMC), School of Graduate and Professional Studies (SGPS), INCEIF University, Kuala Lumpur 50480, Malaysia; mahadi-isra@inceif.org
* Correspondence: abdulproject@yahoo.com; Tel.: +968-22-091-544

Abstract: There is a growing number of published peer-reviewed articles, government reports and investigations from civil societies reporting the poor performance of Public Private Partnerships (PPP)-provided utilities services. The purpose of this desk study is to explore the unreported connection between the source of financing for Public Private Partnerships (PPP) projects in the energy sector and the growing energy poverty across the globe. Energy poverty has become a growing threat to households in both developing and developed countries. Studies have shown that energy poverty results in poor health outcomes, discomfort, and poor economic and intellectual development. The causes of energy poverty have been attributed to rising energy prices, stagnated household incomes and poorly energy-efficient buildings. In response, there are growing calls in many countries for the re-nationalisation of energy companies. However, there is a dearth of studies exploring the connection between conventional interest-based debt finance used in financing PPPs which require tariffs to be designed to achieve cost recovery and overcome the growing energy poverty. Our intention is to show that beyond the private vs. public provision debate, there exists an unexplored third approach that mainstream experts seem to ignore or are oblivious about. We argue that the highly leveraged interest-based financing model currently used by PPP sponsors exacerbates energy poverty because of interest costs built into consumer tariffs. We argue that adopting orthodox non-interest equity-based sukuks as a medium of financing for energy PPPs will lead to a reduction in energy tariffs, and will enhance affordability, sustainability, value-for-money and reduce energy poverty. The emphasis on orthodoxy is derived from the fact that most of the current sukuks in the market violate the core concept of Islamic finance by promising a fixed return to investors.

Keywords: PPP; energy poverty; Islamic project finance; sukuks; debt finance; variable income

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1. Introduction

Modern energy services are crucial to human well-being and to a country's economic growth and development. While developing countries are struggling to provide adequate energy for their growing population to boost economic development and fight poverty (Hall and Niekerk 2013), developed countries are struggling to prevent a growing number of their citizens falling into what has become known as energy poverty. A household is energy poor when it is unable to afford the level of energy services required to allow its members to live a decent life (Middlemiss 2017). Energy poverty (or fuel poverty as it is known in the UK) is defined as a situation where households spend more than 10% of their monthly income on energy services (DECC 2010). It has also been defined as inadequate access to affordable and reliable clean energy (Oyekale and Molelekoa 2023). Both terms, Energy poverty or fuel poverty, are used interchangeably by researchers (Castaño-Rosa et al. 2019) although some designate fuel poverty for developed countries and energy poverty for developing countries (Halkos and Aslanidis 2023). In the US, some

households have had to choose between heating their homes and putting food on the table; about 7 million households have to make this decision every month (EIA 2018). The same situation has also been reported in neighbouring Mexico (Guzmán-Rosas 2023). In Canada, energy poverty is reported to affect about 19% of the population, with houses built pre-1960 being the most vulnerable (Riva et al. 2021). It is reported that energy poverty is on the rise in Europe (CEB 2019); an assessment of the phenomenon in 24 European countries in 2010–2020 found that energy poverty had increased in 13 EU countries (Kryk and Guzowska 2023). In sub-Saharan Africa, the issue has to do with access rather than energy poverty. The 2017 figures show that only about 45% of the population has access to electricity (World Bank 2019). This portion that receives electricity pays very high prices for the service. The remainder rely on traditional sources of energy such as wood and biomass which have negative health effects.

Energy poverty is associated with poor health outcomes, discomfort, and poor economic and intellectual development (Halkos and Aslanidis 2023). Energy poverty also leads to poor mental health issues such as chronic depression, and, in many tragic cases, suicide (Guertler and Smith 2018); about 3200 excess winter deaths are linked to energy poverty. Energy poverty decreases the quality of life, and influences social attainment (Guzmán-Rosas 2023; PHE 2014; Liddell and Morris 2010). Energy poverty has harmful effects on individuals' physical and mental health, on their capacity to find or keep a job, and on their social connections, ultimately impacting growth and the economy, especially in vulnerable communities (Dheret and Giuli 2017).

Globally, energy poverty is reported to be on the rise and exacerbated in the European Union due to its current economic crisis (Castaño-Rosa et al. 2019) and the on-going Russia–Ukraine war (Kryk and Guzowska 2023; Kyprianou et al. 2023). The story is not much different in Australia (KPMG 2017) or even in the USA (EIA 2018). There seems to be a consensus on the causes of energy poverty to include *poorly insulated or inefficient homes*, *low income*, and *high energy prices* (PHE 2014; Okushima 2016; DBEIS 2017; Guertler and Smith 2018; Kryk and Guzowska 2023; Kyprianou et al. 2023). However, there is a dearth of studies linking energy poverty to the so-called energy reforms in the form of Public Private Partnerships (PPPs) or the privatisation of the last three decades. The few studies that have attempted to mention this link (Bouzarovski 2014; Dheret and Giuli 2017) have not made any attempts to draw a connection between the *fixed income* conventional interest-bearing debt-financing underpinning privatised utilities. The PPP model is a non-recourse, project-finance, and *highly leveraged* model of energy provision with a 90–10% debt-to-equity financial structure (Yong 2010). This highly leveraged model relies on designing full-cost-reflective energy tariffs. User charges for energy are based on the estimated revenue required to cover the project's fixed and variable costs (Yescombe 2014, p. 123). In designing energy tariffs, energy companies must take into cognisance the weighted average cost of capital (WACC) from all the various sources of finance and ensure that returns exceed the WACC value to be able to meet their debt service cover ratio (DSCR). The cost of capital (dividends and interest payments) represents a significant part of the cost of electricity (Hall 2016); hence, the lower the better for consumer affordability. The cost of capital for the private sector (7–8%) is double the cost of capital for the government sector which is in the range of 3–4% (NAO 2015). It is reported that interest payments constitute about 27% of UK consumers' water tariffs (Bayliss and Mattioli 2018). A House of Commons report found that a one percent reduction in interest rates for the UK's over GBP 40 billion worth of PPPs would lead to an annual saving of over GBP 400 million (House of Commons Treasury Committee 2011). Others have analysed the current payments in energy costs and suggested that the government should take over energy provision from the private sector, arguing that this action would lead to savings of between GBP 63 billion and GBP 122 billion in direct income to the government over the next two years (Minio-Paluello and Markova 2022) or GBP 248 for every UK household annually, resulting in net savings of GBP 6.5 billion (Hall 2016).

In an earlier critique of interests as a major component of everyday prices, Kennedy (1995) presented an analysis showing that the less the labour component of a utility or service, the higher the interest amount as a percentage of the service fee or tariffs. Her analysis, compiled in Figure 1 above, shows that garbage collection, being labour intensive, has a lower amount than sewerage, which is capital intensive, with 47% of sewerage bills representing interest costs. Another analysis of the UK market indicated that if the government took over provision, compensation to the private owners would only cost GBP 24 billion, while the government would be making GBP 3.2 billion annual savings (Hall 2016). The report further pointed out that renationalisation of the energy sector would ensure affordability for consumers, democratic control, and better progress towards renewable energy (Hall 2016; Kanellou et al. 2023). These arguments are underpinned by the fact that governments are able to borrow at much cheaper rates than the private sector (Hall 2016; Pollock et al. 2002); hence, renationalising the energy sectors across the globe would lead to an immediate reduction in payments resulting from the reduced cost of capital and dividend payments.

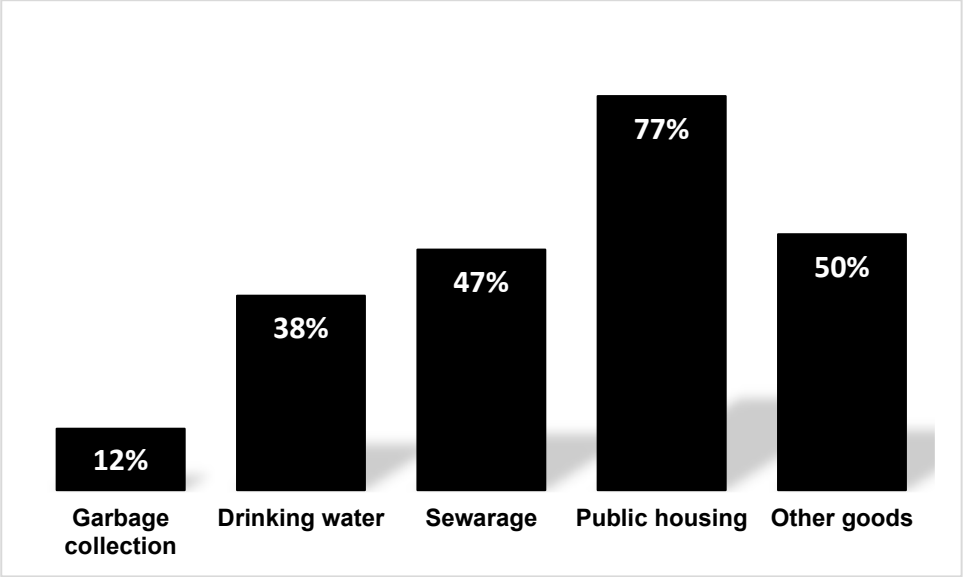

Figure 1. Amount of interest within normal prices/tariffs.

Furthermore, the conventional finance ecosystem in the name of innovation permits the development and use of very toxic financial instruments that increase risks for investors, entrepreneurs, consumers, and the general global economy (Rajan 2006). These innovations in the conventional finance ecosystem have led to extensive financial engineering and complex instruments, the effects of which are unknown even to the developers, but this has enabled investors to earn huge returns that are out of kilter with the performance of the underlying assets (Varoufakis 2017; FCIC 2011; Baird 2009; Rajan 2006). Some of the instruments that have been linked to economic crisis, such as mortgage-backed securities (MBS), Collaterised Debt Obligations (CDOs), contract for difference (CfDs), derivatives, Mark-to-Market accounting, and short selling are only possible within the conventional finance ecosystem. As toxic as these instruments have been found to be (Varoufakis 2017; FCIC 2011; Baird 2009; Rajan 2006), they remain legal within the conventional finance ecosystem in the global economy.

A major solution pursued by developed countries, especially the EU, is focused on retrofitting homes to make homes more energy efficient. But, the high upfront costs of such retrofits makes them unpopular or impractical (Gangale and Mengolini 2019), especially against the backdrop of 75% of EU building stock being energy inefficient (European Commission 2020). Furthermore, it has been found that current EU strategies for combating energy poverty are not working (Streimikiene et al. 2020). Increasing household

incomes across the board to enable affordability would inflate public sector debts and likely result in high rates of inflation, hence being impractical. Also, current financial support measures taken by governments are inefficient at solving the problem (Barrella et al. 2021). One of the most effective strategies to solve energy poverty involves action to reduce energy prices (Fabbri 2015). Current proposals in this direction are limited to replacing expensive private sector debt with cheaper public sector debt (Minio-Paluello and Markova 2022; Bayliss et al. 2021; Kishimoto and Petitjean 2017; Hall 2015, 2016). It has been found that private sector interest costs are on average over 300 basis points above those of the public sector (Cruz and Sarmento 2018; Fernandes et al. 2016). Those advocating for the public takeover of energy companies have recognised the impact of interest costs as a major component of energy tariffs. The study (Kennedy 1995, p. 8) found that in Germany, the interest cost as a percentage of the total cost of service was on average 50% for public services in general. El Diwany (2009, p. 92), on the other hand, found that interest costs constitute about a third of the total capital cost of a project. Therefore, an energy financing solution devoid of interest payments would lead to lower energy tariffs, and consequently a reduction in energy poverty. Even multi-lateral development agencies have begun to recognise the role that non-interest equity-based finance can play in infrastructure financing globally (Ahmed and Abdul Ghani 2023; World Bank 2017; IMF 2015). We argue that the use of equity-based interest-free *variable-income* orthodox *Islamic project finance* can bring affordability closer to citizens while reducing energy poverty. Orthodox is emphasised in this study because in a bid to make sukuks appealing to a broad base of investors, many contemporary sukuk offerings have been designed to mimic conventional *fixed-income* bonds (Haniffa and Hudaib 2010; Khan 2010; Usmani 2007), thereby resulting in a few shocking defaults. However, these recorded sukuk defaults were a function of breaking a cardinal rule of orthodox Islamic finance-*guaranteeing returns to investors* (Wijnbergen and Zaheer 2013; Usmani 2007). Despite the enormous potentials of sukuk financing, this model of finance has not been explored for combating energy poverty, hence the current study. Section 2 looks at energy poverty trends, causes, and impact. Section 3 presents the methods. Section 4 assesses energy provision models and the advantage of Islamic project finance including challenges in Islamic project finance. Section 5 presents the discussions, and Section 6 concludes.

2. Energy Poverty: Trend, Causes, and Impact

It is instructive to note that there seem to be some patterns to the energy poverty issue, but not all countries have the same experience. For example, while the Gulf Co-operation Council (GCC) countries with their strong citizen-centric social order have no energy poverty problems as governments subsidise household energy tariffs, advanced countries such as the USA and the UK are increasingly facing a rising energy poverty problem. There is also a difference in the experience of energy poverty between developing and developed countries; affordability is the major issue in developed countries while availability is the problem in developing countries (Song et al. 2023). It is reported that about 31% of US households struggle to pay their energy bills with some households forgoing food and important medications in the process, and 7 million out of these have to make this decision every month (EIA 2018). Another US study indicates that the amount that sacrifice food and medicine in order to pay energy bills is now about 25 million households (Bednar and Reames 2020). In neighbouring Mexico, it is reported that consumers' energy poverty coping strategies include cutting down on other basic necessities, borrowing to pay for energy, or failing to pay for electricity or fuels, sacrificing food and health (Guzmán-Rosas 2023). The authors further indicated that the situation is impacting development, physical health, mental well-being, and acting as an accelerator of the cycle of risk for energy poverty.

In the UK, some 10% of excess winter deaths are directly attributable to energy poverty (PHE 2014), and a more recent study found that 3200 excess winter deaths are linked directly to people experiencing energy poverty (Guertler and Smith 2018). Since 2013,

the number of households below the energy poverty line has continued to increase in the UK (DBEIS 2017). Energy poverty is threatening job security and job quality in the UK (Minio-Paluello and Markova 2022). Energy sector regulators are behind the times in terms of their ability to police the energy suppliers. This is why it was possible for energy companies to overcharge consumers for over five years without detection by the UK energy regulator (Bayliss et al. 2021; Littlechild 2018). It has also been found that if the UK energy regulator used real market data to index energy companies' costs rather than forecasting, energy consumers would save GBP 3.4 billion over the course of the current price control (Wild 2017). In fact, even when the competition and market authority (CMA) undertook an investigation of energy providers, their methodology and conclusions did not reflect the reality of the UK energy market (Amountzias et al. 2017). Prices have continued to rise driving more people into energy poverty. A petition considered by the UK House of Commons found that gas and electricity prices increased by 96% and 54%, respectively, between August 2021 and August 2022 (Mawhood et al. 2022).

In the EU, energy poverty is on the rise and is particularly widespread in Eastern, Central, and Southern Europe (Bouzarovski 2014). About 50 million people were reported to be experiencing energy poverty in 2018 (Gangale and Mengolini 2019), and the number is expected to rise as a result of the combination of the COVID-19 pandemic and the Russia–Ukraine conflict (Kryk and Guzowska 2023). The situation is reported to have worsened in Spain between 2005 and 2016 (Aristondo and Onaindia 2018). In Portugal, about 17.5% of the population is experiencing energy poverty (Gabriel et al. 2023). In Cyprus, it has been reported that a combination of the COVID-19 pandemic, the Russia–Ukraine war, and the domestic financial crisis has pushed energy prices up by 43% between the second half of 2020 and first quarter of 2022, increasing vulnerability and the number of people in energy poverty (Kyprianou et al. 2023). The situation is the same in Japan and is exacerbated by the move to fossil fuel, resulting from the Fukushima disaster (Okushima 2016). Another aspect of the Japanese case is the seasonality of energy poverty, prevalent in the northern region in winter and southern region in summer (Castaño-Rosa and Okushima 2021). A study in Pakistan's Punjab region found that 32% of the population was experiencing energy poverty (Gill et al. 2022).

Incomes are a key determinant of energy poverty (Guertler and Smith 2018), making affordability an issue among low-income earners. While energy prices have been on a steady rise, household incomes have not kept up with energy prices (CEB 2019). Inflation-adjusted household incomes in the US, for example, have been stagnant for the last 40 years (Desilver 2018). The world's bottom 60% have not had any *real income* growth since the 1980s (WIR 2018). Pitching this reality against ever-increasing energy prices creates a picture of gloom for those on a low income. The response to energy poverty by policy makers around the world has been varied. Within the EU, the Energy Poverty Observatory (EPOV) was created to be the specialised body responsible for policy and advice on eliminating energy poverty (EPOV 2018). Both the EU and the UK have prioritised energy audits and retrofitting as their solutions to energy poverty (Middlemiss 2017; EPOV 2018). These responses have been criticised as not enough or ineffective (Streimikiene et al. 2020; Castaño-Rosa et al. 2019; Middlemiss 2017). In Portugal, three approaches are being canvassed for the management of energy poverty: they include (i) replacing low energy-efficient technologies with cleaner and more efficient alternatives; (ii) providing citizens with detailed information about their home's energy use; and (iii) educating the population on the best-practices for saving energy (Gabriel et al. 2023).

However, the link between energy poverty and the energy provision model is becoming increasingly understood, hence the agitation for a return of energy provision to the public hands or re-nationalisation (Minio-Paluello and Markova 2022; Mercer and Whitfield 2018; Isaacs and Molnar 2017; Quiggin 2017; Hall 2015, 2016, 2020), citing the widespread failures of privatised services in recent times. There is growing recognition in the EU that mitigating energy poverty is not only an energy issue but rather a systems issue which should include discussions about revising the energy market, establishing the

Social Climate Fund, and the "Fit for 55" Package (Kanellou et al. 2023). The authors went further to urge European governments to secure the energy supply and protect consumers from price volatility, including promoting local ownership of energy companies. In Japan, a government subsidy regime is being advocated (Okushima and Okagawa 2013). The sustainability of subsidies in the face of other growing societal needs in the long term is also a critical issue to be considered (El-Katiri and Fattouh 2017). The negative outcomes of energy poverty are compelling enough for governments to be concerned and seek effective, innovative, affordable, and sustainable long-term solutions. A survey conducted by Yougov in the UK shows public opinion to be in favour of government-provided utilities against the current private sector-led provisions that are driving citizens into energy poverty (Dahlgreen 2013), as shown in Figure 2 below.

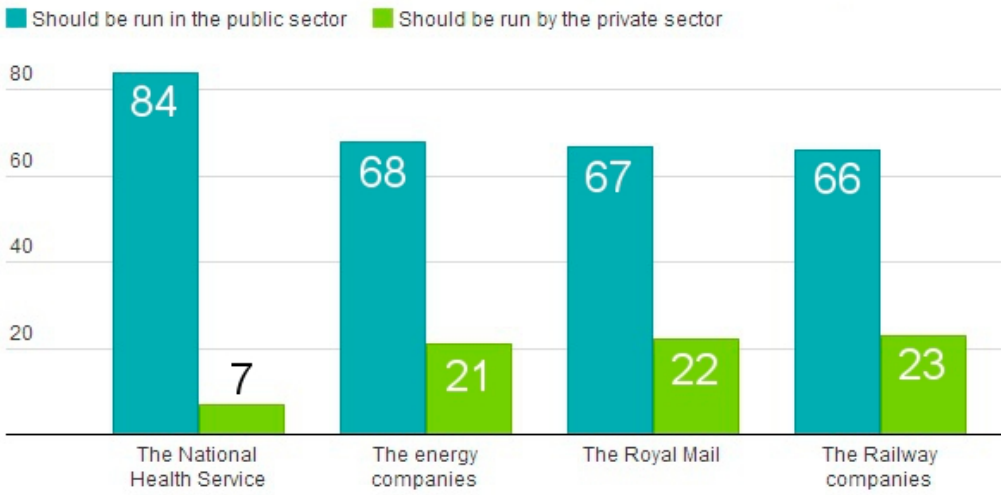

Figure 2. Public opinion on the government provision of public services in the UK. Source: (Dahlgreen 2013).

3. Methods

This study is clearly a desk study entailing the review of existing literature in the areas of energy poverty and infrastructure financing, aiming to show the influence of the provision model on the behaviour of consumers. In addressing the topic of this study, several frameworks of analysis were adopted including historical and bibliometric frameworks (Joița et al. 2023) and the system of provision (SoP) approach (Bayliss et al. 2021; Fine et al. 2018). Examples from Europe, especially the UK, dominate the manuscript because the UK has been at the forefront of adopting and using the PPP model and has the highest number of signed contracts (over 700) to date (Lethbridge and Gallop 2020; NAO 2015); hence, it provides useful materials for an adequate analysis of the model. Consistent with (Joița et al. 2023), the historical method was used to elaborate on the current energy situation globally in terms of the sustainability of supply, economic, and social impacts. The historical framework was also used to provide the impetus that resulted in energy provision being moved from public provision to the current practice of private provision and the ensuing advocacy to return to public provision. The bibliometric analysis demonstrated the growing significance of energy poverty in the scientific literature, and the increasing interest of researchers on the subject of energy poverty across different geographic locations extending from Japan to the United States and from Mexico to Europe. The system of provision approach posits that consumption is integrally connected to the ways in which services are provided (Fine et al. 2018). This approach was used to show how the reforms of the energy sector through privatisations and PPPs brought in expensive private finance into the realm of public services, and forced the design of cost-reflective tariffs resulting in higher consumer bills. This system of provision eventually created an affordability problem among consumers whose real incomes have remained stagnant over the last 40 years. Social policy is framed in terms of individual affordability and consumer choices,

while the inequalities in the underlying system of provision are ignored (Bayliss et al. 2021). It is within this SoP that we situate the use of the Qur'an and Sunnah-based *interest-free* equity-based financing which is intended to eliminate fixed interest payments that do not reflect the performance of the underlying assets. This innovative financing technique has remained in the fringes due to scepticism, and the inherent tax advantages that debt finance enjoys. The SoP framing suggests that the market narrative presents a convenient screen for rent extraction across the energy sector (Bayliss et al. 2021). The SoP significantly impacts how the service will be delivered, thereby systematically creating a filtering mechanism underpinned by the ability to pay for the service (Fine et al. 2018).

4. Energy Services Provision Models

In the early 1990s, governments globally have started moving the costs of municipal service provisions from their annual budgets to what has become known as market-based service provisions. The Global North, especially Europe, has undertaken the journey to market provision in order to fulfil European Union directives *article 126* (European Union 2008). For those in the Global South, the move was a pre-condition for loans from multilateral financial institutions and donor agencies. It started out as privatisation and metamorphosed into PPPs. The process essentially involved the government transferring rights for the provision of municipal services including water supply, waste management, electricity, gas, heating, and telecommunications to private sector consortiums. Different countries structured their models in different ways resulting in different outcomes. The most common model is the non-recourse conventional *debt-financed* model (*Model CF*) which relies on commercial lending with fixed-income repayments. The other models are the government-linked companies model (*Model GLC*), which is essentially provision through state-owned enterprises (SOEs), and the relatively new Islamic project finance Model (*Model IPF*).

4.1. Conventional Debt-Financed Model (Model CF)

This is the most commonly used model by the private consortium for financing PPPs. It is essentially a non-recourse project finance deal. The model is characterised by a highly leveraged financial structure in the range of 90–10% debt-to-equity ratio (Yong 2010). The highly leveraged financial structure results in tariffs being designed to ensure full-cost recovery, thereby pushing affordability out of reach for low-income earners. In terms of repaying lenders, this model is a *fixed-income* repayment model which is further impacted by interest rate movements and time. Based on compounding interest payments with average contract durations of 25–30 years (NAO 2015), the debt grows alarmingly and has to be reflected in the tariffs, hence the higher energy prices. Kennedy has shown that at a 3% interest rate, payments will double in 24 years, while at 6% interest, payments will double in just 12 years. Energy plants entail huge capital investments, and private sector loans are on average 300 basis points (3%) above the public sector's borrowing rates (Cruz and Sarmento 2018; Fernandes et al. 2016). Developing countries face additional challenges as an additional 20–25 basis points are added by lenders to cover for regulatory and political risks. Being the oldest of the three models, its performance is now known in the PPP markets globally. A study of stressed privatised energy projects based on this model found that 90% faced financial stress involving cash flow shortage leading to lower return to investors, risk of default to lenders, inability to pay dues to the host government, and inability to finance the investment program with internal cash (PPIAF 2005). The interest-bearing debt used in financing these PPP projects is a major cause of the problems (Cruz and Sarmento 2018; Fernandes et al. 2016; Gaffney and Pollock 1999). Since these debts rely on a threshold monthly fixed-income repayment, failure to meet the target threshold (DSCR) from consumer tariffs results in default. In order to prevent defaulting on the debt, tariffs must be designed to cover the DSCR. The poor performance and continuous rise in tariffs to cover financial stress are fuelling a wave of remunicipalisations globally (McDonald 2018) as governments react to increasing dissatisfaction by their citizens. As of 2017, over 311 energy contracts have been remunicipalised with Germany leading the pack

(Kishimoto and Petitjean 2017). Conventional debt finance is built on the foundation of compounding interests. It is the relentlessness of compound interests in the face of adversity that sets the potential cruelty of this interest-based system apart from the equity-based return on investments (Visser and McIntosh 1998). Interests wreck cultures, ecosystems, and economic systems (Kennedy 1995). Gesell condemned interests on the basis that his sales prices were often more related to the cost of capital rather than the quality of his product (Gesell 1958). A glimpse of this cruelty can be seen from the COVID-19 pandemic data when productive activities came to a halt globally, yet debtors were expected to continue making amortisation payments on their loans despite non-productive capacity. The conventional debt-finance ecosystem allows practices that are not allowed in any other sphere of human activity. These practices that are permitted within the conventional finance ecosystem further exacerbate the pricing issue in the energy sector. For example, the *Mark-to-Market* accounting approach, which recognises income based on forecast profit rather than actual earned profits, is legal within the conventional finance ecosystem and has led to problems for many businesses that use it. A company's inability to realise the forecast profits triggers a *profit warning*, which then impacts the company's stocks negatively. This was a major cause of the Enron scandal in 2001, and, recently, Carillion UK in 2018. After Carillion, many other PPP contractors have issued profit warnings, as shown in Table 1 below.

Table 1. Profit warnings and their impacts on share price.

Company	Country	Share Price Loss %	Sources
Bouygues	France	20%	Reuters-19-October-2018
Suez SA	France	19%	Bloomberg, 24-January-2018
G4S	UK	10%	Financial Times
Costain	UK	35%	The Guardian, 28-June-2019
Kier	UK	40%	Financial Times, 3-June-2019
Capita	UK	47.5%	The Guardian, 31-January-2018
Interserve	UK	75%	The Economist, 15-December-2018
Carillion	UK	87%	Reuters, 17-November-2017

Offshoring and tax evasion are also unhealthy practices within the conventional finance ecosystem. For example, nine offshore infrastructure funds own about 45.4% of UKs PPPs (Whitfield 2017). These offshore companies have been very successful in using financial engineering to increase their returns to 45–60%, almost five times the rate of returns in the original PPP business case (Whitfield 2016). These returns are derived from the energy tariffs of consumers. Furthermore, an offshore secondary market for the sale of PPP equity has developed a worth over GBP 17 billion and the five largest offshore companies made a total GBP 1.8 billion profit between 2011 and 2015, yet paid zero taxes (Whitfield 2016). Many of these investors are oblivious to the effects of their profit maximisation on energy poverty. Kanellou et al. (2023) have recommended that countries in the EU should pursue domestic ownership of energy companies. The EU and G20 are now pushing policies to forestall tax evasion by corporations using the available loopholes in host-country tax legislations (OECD 2017). Shorting stocks is another unethical practice that exists within the conventional finance ecosystem. It involves investors simply betting against a company's success and profiting from the misery of such companies. Some hedge funds recently lost over USD 6 billion due to short selling in just one month (Andreev et al. 2022). Financial engineering using derivative contracts is used to spread risks across the global economy (Rajan 2006). For example, the global GDP is said to be around USD 105 trillion (IMF 2023); yet, the value of Over-The-Counter (OTC) derivatives outstanding is around USD 618 trillion and this volume is reported to be driven mainly by interest rate derivatives (BIS 2023). With the increasing recognition of the risk-sharing value of equity over debts, many countries and projects in European countries are making a purposeful shift towards increasing equity requirements for privately financed projects (HM Treasury 2012; NAO 2018). Highly leveraged projects are more vulnerable to default

and bankruptcy (Cruz and Sarmento 2018; Fernandes et al. 2016; World Bank 2014, p. 54; Alandejani and Asutay 2017). The UK government in recognition of the negative impact of the current Model CF on its citizens and economy has finally abolished its use for all future infrastructure and services (HM Treasury 2018).

4.2. Government-Linked Companies Model (Model GLC)

The government-linked companies (GLC) model is used to provide energy services and other infrastructures in many countries. In the energy sector, some form of private involvement is allowed in the form of independent power producers (IPP). The government enters into a power purchase agreement (PPA) with a private power generation company. The company is paid for whatever energy it delivers to the grid, while the GLC deals directly with consumers based on the government's strategic goals for the sector. With regard to financing under this model, governments are able to borrow at cheaper costs (Ehrhardt and Irwin 2004; Loxley 2013; Makovsek and Moszoro 2016). Interest rates still have a very profound effect on the final tariffs charged to consumers. For example, on the London underground PPP project with a present value of GBP 15.7 billion (NAO 2004), the private consortiums' interest rates for the project were 20% per annum while the government rate at the time was 4.5% per annum (Williams 2010). The impact of this can be seen in Table 2 below.

Table 2. Scenario analysis of different interest rates on capital cost of project.

Interest Rates	1.00	3.00%	4.50%	20.00%
Capital cost	GBP 15,700,000,000 (30-year amortisation period)			
Total interests	GBP 2,479,065,695	GBP 8,129,059,986	GBP 12,937,853,711	GBP 78,745,976,146
Total loan cost	GBP 18,179,065,695	GBP 23,829,059,986	GBP 28,637,853,711	GBP 94,445,976,146
Monthly payments	GBP 50,497,404	GBP 66,191,833	GBP 79,549,593	GBP 262,349,933

Notes: Interest rate values row represents values of changing cells at the time the Scenario Summary Report was created.

The private sector's total loan cost exceeded what could have been obtained if the government borrowed money to finance the project by over GBP 65 billion; this amount is not inflation-adjusted. Furthermore, the monthly payment under the private regime was more than three-fold higher than what the government would have paid by about GBP 182 million. This effectively shows how interest rates can impact household energy bills, and hence energy poverty. The high financing costs associated with these highly leveraged corporate structures are passed on to customers (Bayliss 2017). If a firm behaves as a rational economic individual, it will seek to minimise its cost of capital (Fellows et al. 2002). This is why governments have been advised to use the cheapest form of available finance when investing in infrastructure (Estache et al. 2015). The cheapest form of financing available to governments is bonds, which are in themselves a form of debt which has to be repaid. Hence, the calls for the nationalisation of energy companies (Minio-Paluello and Markova 2022; Isaacs and Molnar 2017; Quiggin 2017; Hall 2015, 2016, 2020) are only exchanging a higher form of debt for a lower one since government loans are priced lower than private sector loans (Lethbridge and Gallop 2020). But increasing and unsustainable sovereign debts were what drove the switch to the private sector in the first place. Moreover, under GLCs, the government relies on taxes for the repayment of the debt. However, Jones (2014, p. 752) asserted that taxes cannot keep up with compound interests, and hence default will always be lurking. Varoufakis (Varoufakis 2017) asserted that governments never repay their debts; they simply roll it over while paying only the interests on the loan, and as long as they keep paying the interests, they are considered solvent. It has been found that current securitisations of completed renewable energy projects attract returns typically of 6–10%, against a government cost of capital of below 2%. Hence, there are potentially high savings to be achieved with a switch from private to public provision, thereby significantly

reducing the burden on households and businesses (Hall 2020). Some notable GLCs include Oman's Nama Group, Abu Dhabi's TAQA group, Malaysia's Tenaga Nasional, France's EDF, Sweden's Vattenfall, and Germany's EnBW. While the GLC model has been shown to have the capacity to reduce tariffs, and, consequently, energy poverty, GLCs still rely on conventional interest-based financing. Interests are a major cause of rising prices because they are buried in the price of all that we buy (Kennedy 1995, p. 12).

4.3. Islamic Project Finance (Model IPF)

All Abrahamic religions frown upon the charging of interest on loans (Lawal 2016; El Diwany 2009). According to Kennedy (1995, p. 32), many great political and religious figures have tried to reduce social injustice by prohibiting interest payments because they understand their impacts on society. The scourge of interest-bearing loans has been known to man for millennia and has been fought against since medieval times. The early church from Pope Innocent II (1139 AD) until the reign of Pope Leo X forbade lending on interest and even recommended the excommunication of culprits. The church's prohibitions were based on biblical injunctions as contained in Deuteronomy 23:19, ''*You shall not lend upon interest to your brother, interest on money, interest on victual, interest on anything that is lent for interest*", and the death penalty was even prescribed in Ezekiel 18:13. However, while prohibiting the interest upon lending, there was no alternative financing instrument available to consumers and entrepreneurs (Kennedy 1995, p. 32). Contemporary writers on the scourge of interest-bearing loans, including Gesell (1958), Kennedy (1995), El Diwany (2009), and Jones (2014), have argued for interest-free money to suppress the disastrous effects of speculation, hoarding, and usury, which are considered to be the sources of economic crises (Blanc 1998). Kennedy (1995, p. 16) argued that with interest out of the monetary system, money will then follow a natural physical growth pattern rather than the current exponential growth pattern induced by compound interests.

The Islamic project finance model (Model IPF) is structured with guidance from Islamic law prohibiting interest-bearing or *risk-free fixed income* transactions as contained in the Qur'an and Sunnah (prophetic traditions). A unique aspect of Islamic finance is the need to ensure that all financing is backed by a tangible asset to which investors can lay claim. Furthermore, all investors are equal in terms of rights to returns from the investments unlike the conventional ecosystem where investors are divided into senior debt, mezzanine debt, and subordinated debt. However, in order to use Islamic finance for infrastructure of any kind, there are five key issues that must be addressed, and according to Damak (2021) they include the following:

1. The ban on interest: Interest must not be charged or paid on any financial transaction. Money has no intrinsic value, and it is only a vehicle to facilitate transactions.
2. The ban on uncertainty or speculation: Uncertainty in contractual terms and conditions is forbidden. However, risk taking is allowed when all the terms and conditions are clear and known to all parties.
3. The ban on financing certain economic sectors: The financing of industries deemed unlawful by Shariah (Islamic law)—such as weapons, pork, gambling, and pornography—is forbidden.
4. The profit- and loss-sharing principle: Parties to a financial transaction must share the risks and rewards attached to it.
5. The asset-backing principle: Each financial transaction must refer to a tangible, identifiable underlying asset.

Islamic financial institutions proved to be more stable than their conventional counterparts during the 2008 global financial crisis (Beck et al. 2013; Majeed and Abida 2021), although less profitable. This stability pricked the curiosity of researchers, giving rise to increased attention to try and understand its operating mechanism. The interest of researchers can be seen from the growth of articles on Islamic finance shown in Figure 3 below, from less than 200 publications in the ScienceDirect database in 2008, they have grown 683% to 1315 as of 26 September 2023.

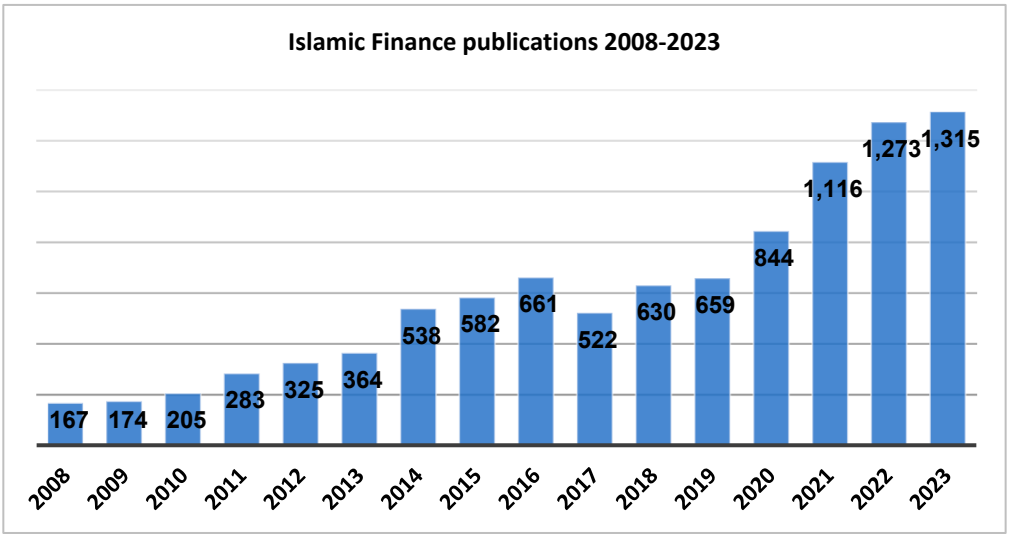

Figure 3. Growth in Islamic finance research publication (ScienceDirect database).

Islamic finance assets are estimated to have grown to USD 3.6 trillion in 2021, up 7.8%, from USD 3.4 trillion in 2020 (IsDB and UNDP 2023). Additionally, S&P Global Ratings believed that the global Islamic finance industry would expand by 10–12% in 2021–2022. Islamic finance expanded rapidly in 2020 with total assets increasing by 10.6% despite the double shock from the COVID-19 pandemic and oil price drop (Damak 2021). It is projected that the global Islamic finance industry will grow to USD 5.9 trillion by 2026 from USD 4 trillion in 2021, mainly driven by its biggest segments, Islamic banks and sukuk (Mohamed and Ahmed 2022). In Islam, the prohibition of charging interests is derived from the Qur'an and the Sunnah (prophetic traditions). The Qur'an states, "*. . .so whosoever receives admonition from his lord and stops eating riba (interests) shall not be punished for the past, his case is for Allah (to Judge) but whoever returns to riba, such are the dwellers of the fire- they will abide therein.*" (Q 2:275). The Qur'an went further in verse 278 to say, "*O believers fear Allah and give up what is still due to you from interest (Usury), if you are true believers*" (Q2:278). From the prophetic traditions, it is reported that "*The messenger of Allah (PBUH) cursed the eater of interests and the one who pays interests it, those who witness it (guarantors) and the one who writes (agreement) it down*"(Sahih Muslim)[1]. It is only Islam that has a comprehensive framework and specific instruments tailored for different types of business enterprise. Several standard Islamic finance instruments are being used to meet the financing needs of infrastructure PPP projects (World Bank 2017). The major instruments consist of *sukuks which could be any of the following Istisna, Ijarah* (leasing), Mudarabah (*profit and loss sharing*), or Musharakah. Musharakat, for instance, is a partnership-based financing instrument that provides capital for the financing of a project in which the partners share profits in a pre-agreed ratio, while losses are shared on the basis of invested equity. As shown in Figure 4 below, the financial institution and other equity investors contribute to the project through the purchase of sukuk investment certificates.

Sukuks are not true interest-bearing instruments, but are structured in a way to channel rents, changes in capital gains/losses, or income to investors in periodic payments (OECD 2015). Sukuk and shares of stock are similar in two ways: they both represent ownership claims and are not guaranteed a return (Hussain et al. 2015). Sukuks are, in some cases, *asset-based*, meaning the originator undertakes repurchasing the assets bought with the sukuk's proceeds at maturity for the same amount equal to the principal repayment. The sukuk holders have no right over the assets but solely rely on the originator's credit worthiness for repayment, either from international sources or based on their ability to refinance. They could also be *asset-backed*, which gives the investors right of ownership over the assets, and they enjoy a stream of income from the underlying asset. This requirement

to be backed by a tangible physical asset connects it to the real economy. Sukuks could limit the extent of leverage associated with financing energy projects (Morea and Poggi 2016).

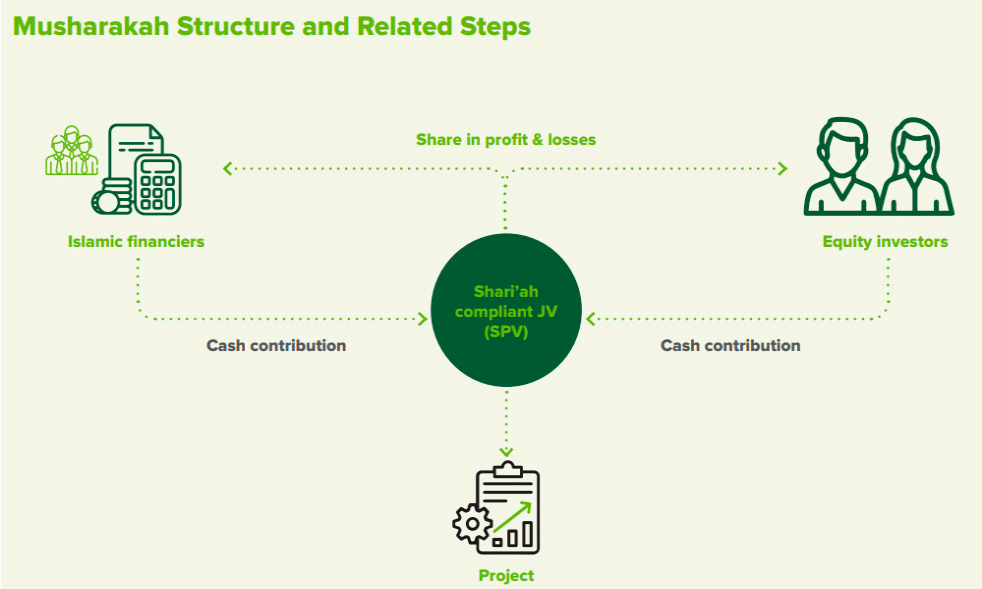

Figure 4. Musharakah financing structure (Source: Ahmed and Abdul Ghani 2023).

Islamic finance operates on the basis of *profit and loss sharing* between partners, and all investors are part-owners of the investment. Most importantly, this model is based on the performance of the underlying or financed project, hence being a *variable income model*. As a result of its *variable income* nature, it is well suited, with *variability in revenue* resulting from changes in energy consumption due to seasonal fluctuations. The model does not require a *debt-service cover ratio* (DSCR), and, consequently, no target revenue needs to be generated. With no target profits being expected, profit warnings would be a thing of the past. Unethical practices that are legal in conventional finance and have been shown to increase risks such as derivatives, short-selling, Collaterised Debt Obligations, Mark-To-Market accounting, and contract for difference (CfDs) are all prohibited in Islamic finance. With the *Basel III* regulations resulting in lower lending volumes and higher interest rates, Islamic project finance could be used to fill the gap created. Many countries, including those in Europe, have experimented with Islamic finance by issuing sukuks. These include Germany, Singapore, Luxembourg, South Africa, Hong Kong, Japan, France, China, and the US (IIFM 2016). Back in 2004, the State of Saxony-Anhalt, Germany, became the first Western government to issue a sukuk, with a 5-year tenured EUR 100 million which matured in July 2009 (Hussain et al. 2015). About 10 years later, Britain would issue its first sukuk for GBP 200 million, which was 10 times oversubscribed. In terms of use, sukuks have been used on the Orasis energy sukuk (France), Mazoon Electric Company (Oman), Khwar Hydro power (Pakistan), Sarawak Hidro sdn Bhd, and Tadau Solar energy (Malaysia).

4.4. Challenges in Islamic Project Finance

It is, however, not all glamourous regarding Islamic project finance due to a number of challenges. Islamic capital comes in the form of equity; hence, given that interests on debt are tax-deductible, there is no incentive for project sponsors to use equity or equity-like sources (Ehrhardt and Irwin 2004). Therefore, many sophisticated investors are usually unwilling to commit their resources to Islamic project-financed endeavours. Furthermore, it has also been reported that higher leverage enables equity investors to achieve higher returns than having higher equity (Yescombe 2014; Ehrhardt and Irwin 2004; Yescombe 2007). Debt also has first claim on SPV assets, and hence they are protected. The same protection is not available for equity. In most cases, infrastructure debts are

guaranteed by host governments in order to encourage foreign investments/investors (Ehrhardt and Irwin 2004); this was the case with the London Underground where the Department for Transport guaranteed 95% of the debt (Williams 2010). Another challenge is the over-marketing by Islamic finance practitioners in order to encourage investors. They have sought to create certainty where it ought not to exist by agreeing to fixed-income returns rather than variable-income, which reflects the actual performance of the underlying asset (Wijnbergen and Zaheer 2013; Haniffa and Hudaib 2010; Khan 2010; Usmani 2007). As Visser and McIntosh (1998) put it, in the case of interests, you know your return and can be sure of it, but in the case of profits, you have to work to ensure it. Modern Islamic financiers have rushed to adopt the institutional structures and product ranges of the conventional interest-based world (El Diwany 2009). In most cases, the problems of contemporary sukuks can be traced back to clauses and structures that have made the *sukuks* more like conventional bonds (Wijnbergen and Zaheer 2013). This has led to serious criticism with some alleging that the only difference between Islamic finance and its conventional counterpart is just the word '*Islamic*' (Haniffa and Hudaib 2010; Khan 2010); this is why orthodox sukuks are being advocated for because most of the current issues in the global Islamic finance markets fall short of the Islamic rules (Shari'ah) in substance (Usmani 2007). Another emerging challenge in the adoption of Islamic project finance is what is referred to as *fatwa shopping* (Oseni 2017). This is essentially the practice of sukuk issuers taking advantage of the divergent opinions among Islamic scholars on the legality of certain instruments to void an obligation that is due. A good example of *fatwa shopping* is the Dana gas incidence in Dubai where the company was trying to avoid paying a due obligation to investors citing 'evolution in interpretation of Islamic law' (Billington and Taha 2018). The good news is that Dana gas lost its suit against investors in a UK court and has recently reached an agreement with investors on a way out. Those intending to use sukuks should stick to the orthodox Islamic finance instruments for which there is consensus among Islamic scholars.

5. Discussions

Generally, the cost of electricity involves the capital expenditure, operational expenditure, and the cost of capital (Hall 2020). Governments around the world made a move to market provision in the early 1980s due to new public management thinking and the lean government mantra. However, after over three decades of the market, many countries are now reversing and re-nationalising their energy sectors to ensure more democratic control. These reversals were pursued due to the ever-increasing prices of energy and excessive profiteering by energy suppliers, many of which were often offshore companies (Whitfield 2017; Whitfield 2016). There is a consensus among researchers, governments, and civil society organisations that the causes of energy poverty include high energy prices, energy-inefficient housing stock, and low incomes (Kryk and Guzowska 2023). Many countries, especially those in Europe, have prioritised home improvements to increase energy efficiency as the first line of defence against energy poverty. But there is now a growing body of evidence that the phenomenon is growing instead of abating, with fingers pointing at the COVID-19 pandemic and the ongoing Russia–Ukraine conflict (Kyprianou et al. 2023). In the developed world, incomes have remained stagnant over the last 40 years. It will be impractical to attempt a blanket income raise as governments do not have such resources under the current economic climate. Using the system of provision approach (Fine et al. 2018) to analyse the situation indicates that the system of provision (PPP) is not unconnected with energy poverty. However, there is an alternative that has not been considered by researchers, experts, and policymakers: the source of financing for energy companies. With the shift to the market and the need to reduce governments' debt-to-GDP ratios and keep projects off-balance sheet, governments have deregulated many utilities and allowed the private sector to source finances on their own. These private providers were considered risky by lenders, and hence interest rates that doubled those for government lending were applied for private sector loans. Energy tariffs had to be

designed to ensure the recovery of these interest payments, resulting in increased bills for consumers. Conventional wisdom dictates that governments should seek the cheapest loans for infrastructure financing (Estache et al. 2015), since interest payments constitute almost a third of a project's financing costs (El Diwany 2009). It becomes a logical attempt to support the agitation for renationalisation (Minio-Paluello and Markova 2022; Hall 2016), which will entail shifting the financing burden to the government which is able to borrow at cheaper rates than the private sector (Lethbridge and Gallop 2020). This is even more important since the House of Commons Treasury committee's assessment found that a one percent reduction in interest rates would lead to savings of over GBP 400 million annually for the UK. But government borrowing also carries interest charges and the longer the duration of the loan, the greater the interest burden. Across the developed world, governments are facing a constricting fiscal space, and this is compounded by demographic restructuring as older citizen populations are increasing. The availability of a mode of financing that is interest-free and that would truly be an off-balance sheet without recourse to government finances will surely be a welcomed development for policymakers. Although all known religions frown at interest-bearing loans, only Islam has remained resilient in its stance against the charging of interest on loans. Most importantly, the Islamic financing model does not permit the development and use of synthetic financial instruments for spreading risks, as is common in conventional finance. Instead, Islamic project finance is designed to share both profits and losses. The prohibition of synthetic financial instruments means toxic derivatives and the shorting of stocks cannot be achieved under this model, thereby creating stability in the economy and financial system in general. With the absence of interest, inflation will no longer be an issue (Kennedy 1995). Having shown that interest charges are a burden transferred to energy consumers through tariffs, eliminating interest payments through the use of Islamic project finance can help to reduce household energy bills. This could slow the energy poverty crises being experienced in many countries, especially developed ones.

Table 3 provides the response of the various models of energy financing to common investment events. Item 7 on the table is a major cause of project failure (bankruptcy, loan defaults) across different PPP infrastructures including energy, roads, water supply, bridges, and tunnels.

Table 3. Comparing three financing models for PPPs.

S/No.	Event	Conventional Debt Finance	Government-Linked Companies	Islamic Finance
1	Nature of Finance	Debt-based finance	Bilateral loan/commercial at risk-free rate	Equity-based finance
2	During construction	Debt grows due to interest while project not making money. Impacts tariffs. Rate is over 10% for sub-Saharan Africa	Debt grows due to interest while project not making money. Interest rate is very low, 3–4%	No effect on investment, and no distributions to investors. No effect on service tariff
3	Delays during construction	Debt continues to grow and impacts final tariffs	Debt continues to grow and impacts final tariffs. Government may subsidise	NO effect on equity. No distributions to investors. No effect on service tariff
4	Interest swap	High breakage fee required	Usually fixed for bilateral loans	Interest-free/no interest swaps
5	Exchange rate risk	Increased tariffs	Government guarantee	Local currency-based equity
6	Changes to contract	Expensive to make changes	Absorbed by SPV/government subsidy	Permitted pro rata without extra fees
7	Inability to meet forecasted revenue	Loan default/higher tariffs/failure or government bailout	Higher tariffs or government subsidies	Variable returns-based/ investors bear risk

Table 3. *Cont.*

S/No.	Event	Conventional Debt Finance	Government-Linked Companies	Islamic Finance
8	Value of revenue required	Must cover debt service, interests, profits, and Opex	Should cover debt service, interests, and Opex. Government support	Investors absorb risk. Distribute what is left after Opex
9	Compatibility with Sustainability	Not compatible, revenues rely on higher consumption	Not compatible, government can enforce compliance at a cost	Compatible. Sustainability is one of its goals.
10	Bankruptcy	Government guarantees the debt portion while sponsors lose equity	Government steps in to offset bilateral loan	Investors bear risk of bankruptcy, absence of senior debt, everyone shares in recovery
11	Nature of project Ownership	Reverts to government at end of contract	Government owned, SPV may be dissolved after loan repayment	Owned by investors. Must be bought back by govt at current market value.

6. Conclusions

Energy poverty has become a credible threat to the comfort, health, and well-being of the world's population. Governments in both developed and developing countries have to come up with innovative ideas and means to solve the problem. While at the individual level, home improvements that foster energy efficiency can be undertaken, this does not solve the nexus between stagnated household incomes and continuously rising energy prices. A blanket increase in global household incomes is not a feasible option and neither is continuous subsidy in the face of other social sectors requiring funding. The current financing structure for municipal services globally is not sustainable as has been shown by the impact of the global financial crisis, the *Basel III* regulatory guidance, and growing sovereign debts. A higher leverage benefits investor through lower taxes and better government protection comes to the detriment of consumers. It is instructive to note that even within the EU, efforts are now being made to restrict interest expense deductions by companies as governments are losing out on huge revenues through these deductions (OECD 2017). Therefore, innovative and sustainable solutions that would dampen the need for yearly price reviews and eliminate the interest portions in energy tariff structures have become pertinent. It has become clear that debt-based financing of municipal energy services is a major factor in the energy poverty debate. Higher tariffs are pushing millions of people into energy poverty. This is because the interest costs must be factored into the energy tariffs. The current alternatives being advocated for public ownership and provision are also likely to run into trouble because debt increases 2–3 times faster than the economic productivity of a country (Kennedy 1995), and taxes cannot keep up with compound interests (Jones 2014, p. 752). Consequently, solutions such as equity-based non-interest financing models hold a lot of promise (Gesell 1958; Kennedy 1995; Visser and McIntosh 1998; El Diwany 2009; Jones 2014). Given the interest-free nature of Islamic finance and its equity-like behaviour, it is argued that its adoption for financing energy PPPs could contribute towards curbing the growing energy poverty globally. This is because using Islamic finance will eliminate interest payments, which eat up almost a third of a project's capital costs (El Diwany 2009), and has to be recovered through tariffs. The use of equity-based Islamic project finance instruments will eliminate the pressures to meet lenders' debt cover requirements, inflation adjustments, and consequently upward tariff reviews. Governments, politicians, and policy-makers have a huge role to play in ensuring the success of these proposed solutions through supporting legislations and granting a tax-exempt status to any equity invested in infrastructure. Governments and Islamic finance practitioners need to work harder to create awareness of the benefits and feasibility of applying Islamic finance for energy infrastructure. As more stakeholders become more aware of the merits and feasibility, the environments will become more amenable to the deployment of Islamic finance for

PPP projects (World Bank 2017). The government must build institutional capacity in Islamic finance deployment through capacity building (Ahmed and Abdul Ghani 2023). Other policy recommendations include the standardisation of documentation, setting up shari'ah-compliant infrastructure funds, and creating an enabling environment through legal and regulatory frameworks (World Bank 2017). It is also important that governments in developing countries encourage more local currency equity investments rather than foreign equity to protect against currency exchange risks, external shocks, and sudden capital outflows.

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Notes

[1] Sahih Muslim-Book of Transactions Vol. 5, Hadith no. 3380.

References

Ahmed, Tayyab, and Nur Aina Abdul Ghani. 2023. *OIC Infrastructure Outlook 2023: Creating Opportunities, Enhancing Linkages*. London: ICD and Refinitiv.

Alandejani, Maha, and Mehmet Asutay. 2017. Nonperforming loans in the GCC banking sectors: Does the Islamic finance matter? *Research in International Business and Finance* 42: 832–54.

Amountzias, Chrysovalantis, Hulya Dagdeviren, and Tassos Patokos. 2017. A waste of energy? A critical assessment of the investigation of the UK energy market by the Competition and Markets Authority. *Competition & Change* 21: 45–60. [CrossRef]

Andreev, Boris, Georgios Sermpinis, and Charalampos Stasinakis. 2022. Modelling Financial Markets during Times of Extreme Volatility: Evidence from the GameStop Short Squeeze. *Forecasting* 4: 654–73. [CrossRef]

Aristondo, Oihan, and Eneritz Onaindia. 2018. Inequality of Energy Poverty between groups in Spain. *Energy* 153: 431–42.

Baird, Vanessa. 2009. Naked Emperors. In *People-First Economics*. Edited by David Ransom and Vanessa Baird. Oxford: New Internationalist Publications Ltd., pp. 65–83.

Barrella, Roberto, José Ignacio Linares, José Carlos Romero, Eva Arenas, and Efraim Centeno. 2021. Does cash money solve energy poverty? Assessing the impact of household heating allowances in Spain. *Energy Research & Social Science* 80: 102216.

Bayliss, Kate. 2017. Material cultures of water financialisation in England and Wales. *New Political Economy* 22: 383–97. [CrossRef]

Bayliss, Kate, and Giulio Mattioli. 2018. *Privatisation, Inequality and Poverty in the UK: Briefing Prepared for UN Rapporteur on Extreme Poverty and Human Rights*. London: Sustainability Research Institute (SRI), Papers No. 116.

Bayliss, Kate, Giulio Mattioli, and Julia Steinberger. 2021. Inequality, poverty and the privatization of essential services: A "systems of provision" study of water, energy and local buses in the UK. *Competition and Change* 25: 478–500. [CrossRef]

Beck, Thorsten, Asli Demirgüç-Kunt, and Ouarda Merrouche. 2013. Islamic vs. conventional banking: Business model, efficiency and stability. *Journal of Banking & Finance* 37: 433–47.

Bednar, Dominic J., and Tony G. Reames. 2020. Recognition of and response to energy poverty in the United States. *Nature Energy* 5: 432–39.

Billington, David J., and Mohamed Taha. 2018. Can the Sukuk Industry Survive the Dana Gas Dispute? *Emerging Markets Restructuring Journal*. Available online: https://scholar.google.com/scholar?cluster=5419906139176854872&hl=en&as_sdt=0,5 (accessed on 10 August 2023).

BIS. 2023. OTC Derivatives Statistics at End-December 2022. Available online: https://www.bis.org/publ/otc_hy2305.pdf (accessed on 5 July 2023).

Blanc, Jérôme. 1998. Silvio Gesell's Theory and Accelerated Money Experiments. halshs-00119192. Available online: https://shs.hal.science/halshs-00119192/ (accessed on 10 August 2023).

Bouzarovski, Stefan. 2014. Energy poverty in the European Union: Landscapes of vulnerability. *Energy Environment* 3: 276–89.

Castaño-Rosa, Raúl, and Shinichiro Okushima. 2021. Prevalence of energy poverty in Japan: A comprehensive analysis of energy poverty vulnerabilities. *Renewable and Sustainable Energy Reviews* 145: 111006. [CrossRef]

Castaño-Rosa, Raúl, Jaime Solís-Guzmán, Carlos Rubio-Bellido, and Madelyn Marrero. 2019. Towards a multiple-indicator approach to Energy Poverty in the European Union: A review. *Energy and Buildings* 193: 36–48.
CEB. 2019. *Energy Poverty in Europe: How Energy Efficiency and Renewables Can Help*. Paris: Council of Europe Development Bank (CEB).
Cruz, Carlos Oliveira, and Joaquim Miranda Sarmento. 2018. The Price of Project Finance Loans for Highways. *Research in Transport Economics* 70: 161–72.
Dahlgreen, Will. 2013. Nationalise Energy and Rail Companies, Say Public. Available online: https://yougov.co.uk/topics/politics/articles-reports/2013/11/04/nationalise-energy-and-rail-companies-say-public (accessed on 13 March 2021).
Damak, Mohamed. 2021. *Islamic Finance Outlook*, 2022 ed. New York: S&P Global Ratings.
DBEIS. 2017. *Annual Fuel Poverty Statistics Report, 2017*. London: Department for Business, Energy & Industrial Strategy (DBEIS).
DECC. 2010. *Fuel Poverty Methodology Handbook*. London: Department of Energy and Climate Change (DECC).
Desilver, Drew. 2018. For Most U.S. Workers, Real Wages Have Barely Budged in Decades. Available online: https://www.pewresearch.org/fact-tank/2018/08/07/for-most-us-workers-real-wages-have-barely-budged-for-decades/ (accessed on 18 December 2022).
Dheret, Claire, and Marco Giuli. 2017. *The Long Journey to End Energy Poverty in Europe*. Brussels: European Policy Centre.
Ehrhardt, David, and Timothy Irwin. 2004. *Avoiding Customer and Taxpayer Bailouts in Private Infrastructure Projects: Policy toward Leverage, Risk Allocation, and Bankruptcy*. Washington, DC: The World Bank.
EIA. 2018. One in Three U.S Households Faces a Challenge in Meeting Energy Needs. Available online: https://www.eia.gov/todayinenergy/detail.php?id=37072 (accessed on 20 March 2021).
El Diwany, Tarek. 2009. The Trouble with Interest. In *People-First Economics*. Edited by David Ransom and Vanessa Baird. Oxford: New Internationalist Publications Ltd., pp. 85–96.
El-Katiri, Laura, and Bassam Fattouh. 2017. A Brief Political Economy of Energy Subsidies in the Middle East and North Africa. In *Combining Economic and Political Development: The Experience of MENA*. International Development Policy Series 7; Edited by Giacomo Luciani. Geneva: Graduate Institute Publications, Boston: Brill-Nijhoff, pp. 58–87. [CrossRef]
EPOV. 2018. Designing Effective Energy Poverty Policies in Municipalities. Available online: www.energypoverty.eu (accessed on 20 March 2021).
Estache, Antonio, Tomas Serebrisky, and Wren-Lewis Liam. 2015. Financing Infrastructure In Developing Countries. *Oxford Review of Economic Policy* 31: 279–304. [CrossRef]
European Commission. 2020. *Energy Efficiency in Buildings*. Brussels: European Commission, Energy Department.
European Union. 2008. *The Treaty on the Functioning of the European Union*. Brussels: Official Journal of the European Union.
Fabbri, Kristian. 2015. Building and fuel poverty, an index to measure fuel poverty: An Italian case study. *Energy* 89: 244–58.
FCIC. 2011. *The Financial Crisis Inquiry Report*. Washington, DC: The Financial Crisis Inquiry Commission (FCIC).
Fellows, Richard, David Langford, Robert Newcombe, and Sydney Urry. 2002. *Construction Management in Practice*, 2nd ed. Paris: Blackwell Science Ltd.
Fernandes, Carlos, Miguel Ferreira, and Filipe Moura. 2016. PPPs-True Financial Costs and Hidden Returns. *Transports Review* 36: 207–27.
Fine, Ben, Kate Bayliss, and Mary Robertson. 2018. The Systems of Provision Approach to understanding consumption. In *The SAGE Handbook of Consumer Culture*. Edited by Olga Kravets, Pauline Maclaran, Steven Miles and Alladi Venkatesh. London: Sage, pp. 27–42.
Gabriel, Marta Fonseca, João Pedro Cardoso, Fátima Felgueiras, Joana Azeredo, David Filipe, Peter Conradie, Stephanie Van Hove, Zenaida Mourão, Filippos Anagnostopoulos, and Isabel Azevedo. 2023. Opportunities for Promoting Healthy Homes and Long-Lasting Energy-Efficient Behaviour among Families with Children in Portugal. *Energies* 16: 1872. [CrossRef]
Gaffney, Declan, and Allyson M. Pollock. 1999. Pump-Priming the PFI: Why are Privately Financed Hospital Schemes being Subsidised? *Public Money & Management* 19: 55–62.
Gangale, Flavia, and Anna-Maria Mengolini. 2019. *Energy Poverty through the Lens of EU Research and Innovation Projects*. Luxembourg: Publications Office of the European Union. [CrossRef]
Gesell, Silvio. 1958. *The Natural Economic Order*. London: Owen.
Gill, Abid Rashid, Najma Rasheed, Muhammad Abrarulhaq, and Farheen Akram. 2022. *An Estimation of the Multidimensional Energy Poverty Index in Pakistan*. Manama: IEEE, pp. 58–63.
Guertler, Pedro, and Peter Smith. 2018. *Cold Homes and Excess Winter Deaths*. London: National Energy Action and E3G.
Guzmán-Rosas, S. Carolina. 2023. Strategies Used by Rural Indigenous Populations to Cope with Energy Poverty, in San Luis Potosí, Mexico. *Energies* 16: 4479. [CrossRef]
Halkos, George E., and Palagiotis-Stavros C. Aslanidis. 2023. Addressing Multidimensional Energy Poverty Implications on Achieving Sustainable Development. *Energies* 16: 3805. [CrossRef]
Hall, David. 2015. *Why Public-Private Partnerships Don't Work: The Many Advantages of the Public Alternative*. Ferney-Voltaire: Public Services International (PSI).
Hall, David. 2016. *Public Ownership of the UK Energy System—Benefits, Costs and Processes*. London: Public Services International Research Unit (PSIRU).
Hall, David. 2020. *The UK 2019 Election: Defeat for Labour, but Strong Support for Public Ownership*. PSIRU Working Paper. Greenwich: University of Greenwich.
Hall, David, and Sandra V. Niekerk. 2013. *Overview of Energy in Africa*. Greenwich: Public Services International Research Unit (PSIRU).

Haniffa, Roszaini, and Muhammad Hudaib. 2010. Islamic finance: From sacred intentions to secular goals? *Journal of Islamic Accounting and Business Research* 1: 85–91.
HM Treasury. 2012. *A New Approach to Public Private Partnerships*. London: HM Treasury.
HM Treasury. 2018. *Budget 2018*. London: HM Treasury.
House of Commons Treasury Committee. 2011. *Private Finance Initiative, Seventeenth Report of Session 2010–2012, HC 1146*. London: The Stationery Office.
Hussain, Mumtaz, Asghar Shahmoradi, and Rima Turk. 2015. *An Overview of Islamic Finance*. Paris: International Monetary Fund (IMF).
IIFM. 2016. *IIFM Sukuk Report*, 5th ed. Manama: International Islamic Finance Market (IIFM).
IMF. 2015. Islamic Finance and the Role of the IMF. Available online: http://www.imf.org/external/themes/islamicfinance/ (accessed on 10 August 2023).
IMF. 2023. GDP-Current Prices. Available online: https://www.imf.org/external/datamapper/NGDPD@WEO/OEMDC/ADVEC/WEOWORLD (accessed on 5 July 2023).
Isaacs, Rico, and Adam Molnar. 2017. Island in the neoliberal stream: Energy security and soft re-nationalisation in Hungary. *Journal of Contemporary European Studies* 25: 107–26. [CrossRef]
IsDB, and UNDP. 2023. *Case Studies on Innovations in Islamic Financ*. Kuala Lumpur: Islamic Development Bank (IsDB) & United Nations Development Programme (UNDP).
Joița, Diana, Mirela Panait, Carmen-Elena Dobrotă, Alin Diniță, Adrian Neacșa, and Laura Elly Naghi. 2023. The European Dilemma—Energy Security or Green Transition. *Energies* 16: 3849. [CrossRef]
Jones, Michael E. 2014. *Barren Metal: A History of Capitalism as the Conflict between Labor and Usury*, 1st ed. South Bend: Fidelity Press.
Kanellou, Eleni, Arthur Hinsch, Veljko Vorkapić, Alis-Daniela Torres, Georgios Konstantopoulos, Nektarios Matsagkos, and Haris Doukas. 2023. Lessons Learnt and Policy Implications from Implementing the POWERPOOR Approach to Alleviate Energy Poverty. *Sustainability* 15: 8854. [CrossRef]
Kennedy, Margrit. 1995. *Interest and Inflation Free Money: Creating an Exchange Medium That Works for Everybody and Protects the Earth*, 1st ed. British Columbia: New Society Publishers.
Khan, Feisal. 2010. How 'Islamic' is Islamic Banking? *Journal of Economic Behavior & Organization* 76: 805–20.
Kishimoto, Satoko, and Olivier Petitjean. 2017. *Reclaiming Public Services: How Cities and Citizens Are Turning Back Privatization*. Paris and Amsterdam: Transnational Institute (TNI).
KPMG. 2017. *The Rise of Energy Poverty in Australia*. Gold Coast: KPMG.
Kryk, Barbara, and Malgorzata K. Guzowska. 2023. Assessing the Level of Energy Poverty Using a Synthetic Multidimensional Energy Poverty Index in EU Countries. *Energies* 16: 1333. [CrossRef]
Kyprianou, Ioanna, Despina Serghides, Harriet Thomson, and Salvatore Carlucci. 2023. Learning from the Past: The Impacts of Economic Crises on Energy Poverty Mortality and Rural Vulnerability. *Energies* 16: 5217. [CrossRef]
Lawal, Ibrahim Mohammad. 2016. Riba (Usury): A Tool That Should Be Carved Out Of Financial Transactions. *Turkish Journal of Islamic Economics* 3: 13–24. [CrossRef]
Lethbridge, Jane, and Pippa Gallop. 2020. *Why Public-Private Partnerships (PPPs) Are Still Not Delivering*. Brussels: Eurodad/European Public Services Union (EPSU).
Liddell, Christine, and Chris Morris. 2010. Fuel poverty and human health: A review of recent evidence. *Energy Policy* 38: 2987–97.
Littlechild, Stephen. 2018. Competition, regulation and price controls in the GB retail energy market. *Utilities Policy* 52: 59–69. [CrossRef]
Loxley, John. 2013. Are Public-Private Partnerships (PPPs) the Answer to Africa's Infrastructure Needs? *Review of African Political Economy* 40: 485–95. [CrossRef]
Majeed, Muhammad, and Zainab Abida. 2021. A comparative analysis of financial performance of Islamic banks vis-à-vis conventional banks: Evidence from Pakistan. *ISRA International Journal of Islamic Finance* 13: 331–46.
Makovsek, Dejan, and Marian Moszoro. 2016. *Private Sector Participation in Infrastructure: Can the Price of Risk Transfer be Efficient?* Paris: Organisation for Economic Co-operation and Development (OECD) and International Transport Forum.
Mawhood, Becky, Georgina Hutton, and Nikki Sutherland. 2022. *Public Ownership of Energy Companies*. London: House of Commons Library.
McDonald, David Alexander. 2018. Remunicipalization: The future of water services? *Geoforum* 91: 47–56.
Mercer, Helen, and Dexter Whitfield. 2018. *Nationalising Special Purpose Vehicles to End PFI: A Discussion of the Costs and Benefits*. Greenwich: Public Services International Research Unit (PSIRU).
Middlemiss, Lucie. 2017. A critical analysis of the new politics of fuel poverty in England. *Critical Social Policy* 37: 425–43. [CrossRef]
Minio-Paluello, Mika, and Anna Markova. 2022. *Public Ownership of Clean Power: Lower Bills, Climate Action, Decent Jobs*. London: Trades Union Congress (TUC).
Mohamed, Shereen, and Tayyab Ahmed. 2022. *Islamic Finance Development Report 2022: Embracing Change*. London: ICD-Refinitiv.
Morea, Donato, and Luigi Antonio Poggi. 2016. *Islamic Finance and Renewable Energy: An Innovative Model for the Sustainability of Investments*. Capri: IEEE Xplore.
NAO. 2004. *London Underground PPP: Were They Good Deals?* London: National Audit Office (NAO).
NAO. 2015. *The Choice of Finance for Capital Investment*. London: National Audit Office (NAO).
NAO. 2018. *PFI and PF2*. London: National Audit Office.

OECD. 2015. *Infrastructure Financing Instruments and Their Incentives*. Paris: Organisation for Economic Co-operation and Development (OECD).
OECD. 2017. *Limiting Base Erosion Involving Interest Deductions and Other Financial Payments, Action 4—2016 Update: Inclusive Framework on BEPS, OECD/G20 Base Erosion and Profit Shifting Projec*. Paris: OECD Publishing.
Okushima, Shinichiro. 2016. Measuring energy poverty in Japan, 2004–2013. *Energy Policy* 98: 557–64. [CrossRef]
Okushima, Shinichiro, and Azusa Okagawa. 2013. *Energy Poverty in Japan: How Does the Energy Price Escalation Affect Low Income and Vulnerable Households?* Anchorage: International Association for Energy Economics (IAEE).
Oseni, Umar A. 2017. Fatwā shopping and trust: Towards effective consumer protection regulations in Islamic finance. *Society and Business Review* 12: 340–55. [CrossRef]
Oyekale, Abayomi Samuel, and Thonaeng Charity Molelekoa. 2023. Multidimensional Indicator of Energy Poverty in South Africa Using the Fuzzy Set Approach. *Energies* 16: 2089. [CrossRef]
PHE. 2014. *Fuel Poverty and Cold Homes-Related Health Problems*. London: Public Health England & UCL Insitute of Health Equity.
Pollock, Allyson, Jean Shaoul, and Neil Vickers. 2002. Private Finance and "Value for Money" in NHS Hospitals: A Policy in Search of a Rationale? *British Medical Journal* 324: 1205–9. [CrossRef]
PPIAF. 2005. *Analysis of Power Projects with Private Participation under Stress*. Washington, DC: Public-Private Infrastructure Advisory Facility (PPIAF).
Quiggin, John. 2017. The case for renationalising Australia's electricity grid. *Green Left Weekly* 1129: 11.
Rajan, Raghuram G. 2006. Has finance made the world riskier? *European Financial Managemen* 12: 499–533.
Riva, Mylene, Sophie Kingunza Makasi, Philippe Dufresne, Kimberley O'Sullivan, and Megan Toth. 2021. Energy poverty in Canada: Prevalence, social and spatial distribution, and implications for research and policy. *Energy Research & Social Science* 81: 102237. [CrossRef]
Song, Mei, Jia Zhang, Xiaohao Liu, Liyan Zhang, Xuguang Hao, and Mengxue Li. 2023. Developments and Trends in Energy Poverty Research—Literature Visualization Analysis Based on CiteSpace. *Sustainability* 15: 2576. [CrossRef]
Streimikiene, Dalia, Vidas Lekavičius, Tomas Baležentis, Grigorios L. Kyriakopoulos, and Josef Abrhám. 2020. Climate Change Mitigation Policies Targeting Households and Addressing Energy Poverty in European Union. *Energies* 13: 3389. [CrossRef]
Usmani, Muhammad. 2007. *Sukuk and Their Contemporary Applications*. Manama: Accounting and Auditing Organization for Islamic Financial Institutions (AAOIFI).
Varoufakis, Yanis. 2017. *Adults in the Room: My Battle with Europe's Deep Establishment*. London: The Bodley Head.
Visser, Wayne A., and Alastair McIntosh. 1998. A Short Review of the Historical Critique of Usury. *Accounting, Business & Financial History* 8: 175–89.
Whitfield, Dexter. 2016. *The Financial Commodification of Public Infrastructure*. Brussels: European Services Strategy Unit (ESSU), Research Report No.8.
Whitfield, Dexter. 2017. *PFI/PPP Buyouts, Bailouts, Terminations and Major Problem Contracts in UK*. County Kerry: European Services Strategy Unit.
Wijnbergen, Sweder V., and Sajjad Zaheer. 2013. *Sukuk Defaults: On Distress Resolution in Islamic Finance*. Amsterdam: Tinbergen Institute.
Wild, Morgan. 2017. *Energy Consumers' Missing Billions: The Profits Gifted to Energy Networks*. London: Report for Citizens Advice Bureau.
Williams, Trefor. 2010. *Analysis of the London Underground PPP Failure*. South Lake Tahoe: Proceedings of Engineering Project Organisations Conference (EPOC) 2010.
WIR. 2018. *World Inequality Report 2018*. Berlin: World Inequality Lab.
World Bank. 2014. *Public-Private Partnerships Reference Guide Version 2.0*. Washington, DC: The World Bank.
World Bank. 2017. *Mobilizing Islamic Finance for Infrastructure Public-Private Partnerships*. Washington, DC: The World Bank.
World Bank. 2019. Access to Electricity in Sub-Saharan Africa (% of Population). Available online: https://data.worldbank.org/indicator/EG.ELC.ACCS.ZS?locations=ZG (accessed on 29 July 2019).
Yescombe, Edward R. 2007. *Public Private Partnerships: Principles of Policy and Finance*. London: Butterworth-Heinemann.
Yescombe, Edward R. 2014. *Principles of Project Finance*. London: Academic Press.
Yong, H. Kim. 2010. *Public-Private Partnerships Policy and Practice—A Reference Guide*. London: Commonwealth Secretariat.