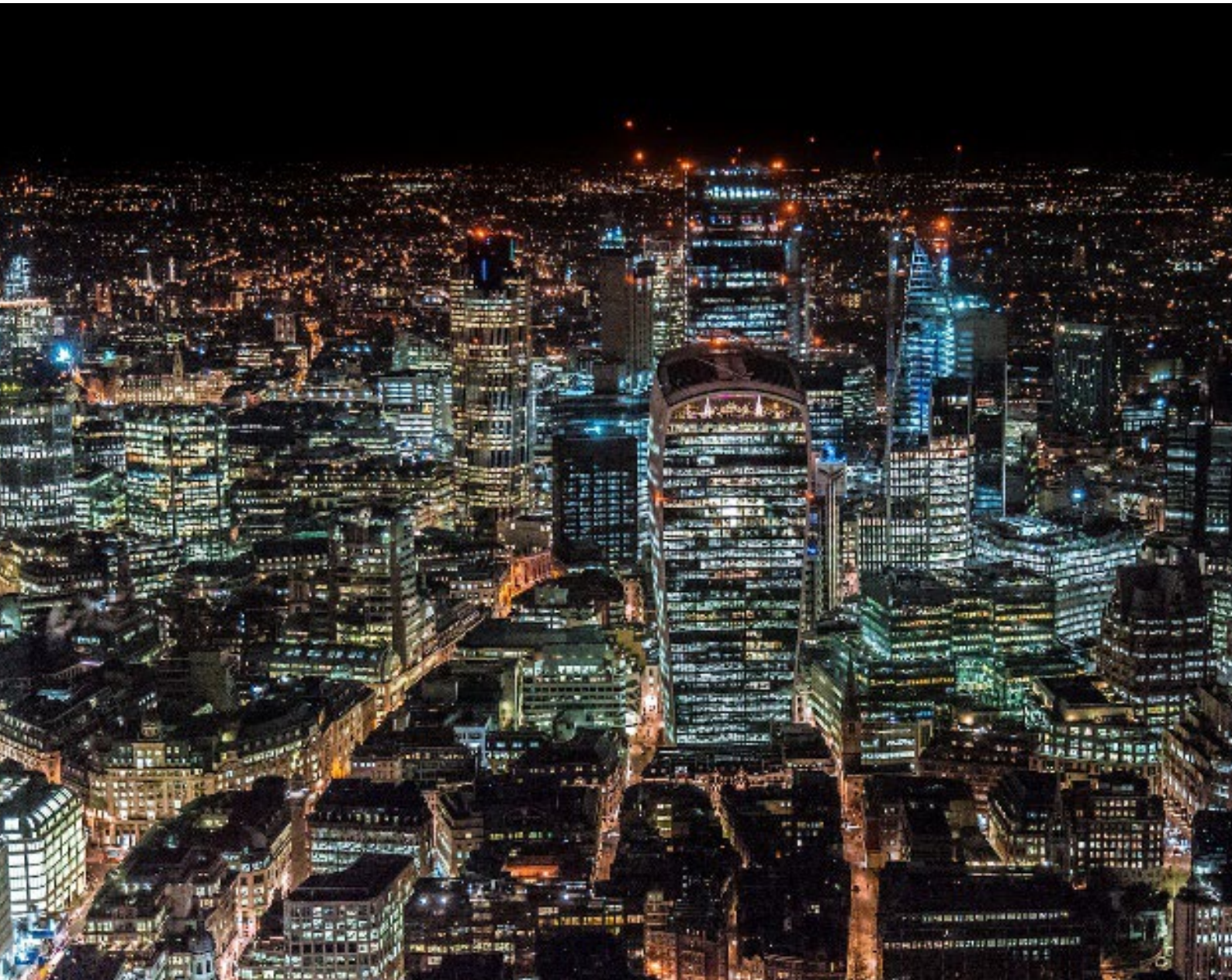
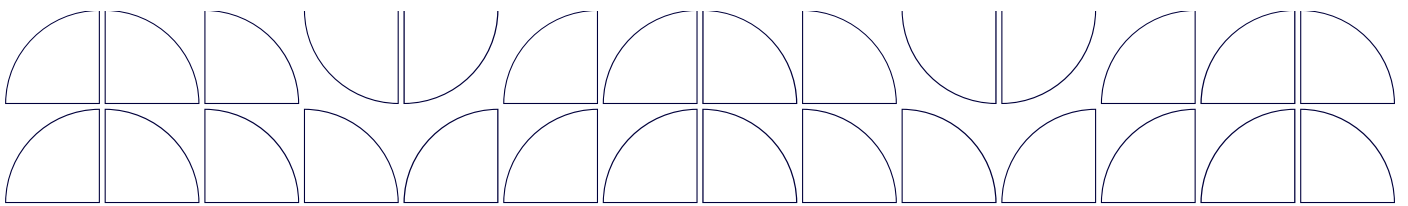


Definition of sunset and sunrise industries: The interplay of industries and their strategies at different stages of their evolution

Policy Brief

Dr Brunilde Verrier, Professor Neil Strachan
UCL

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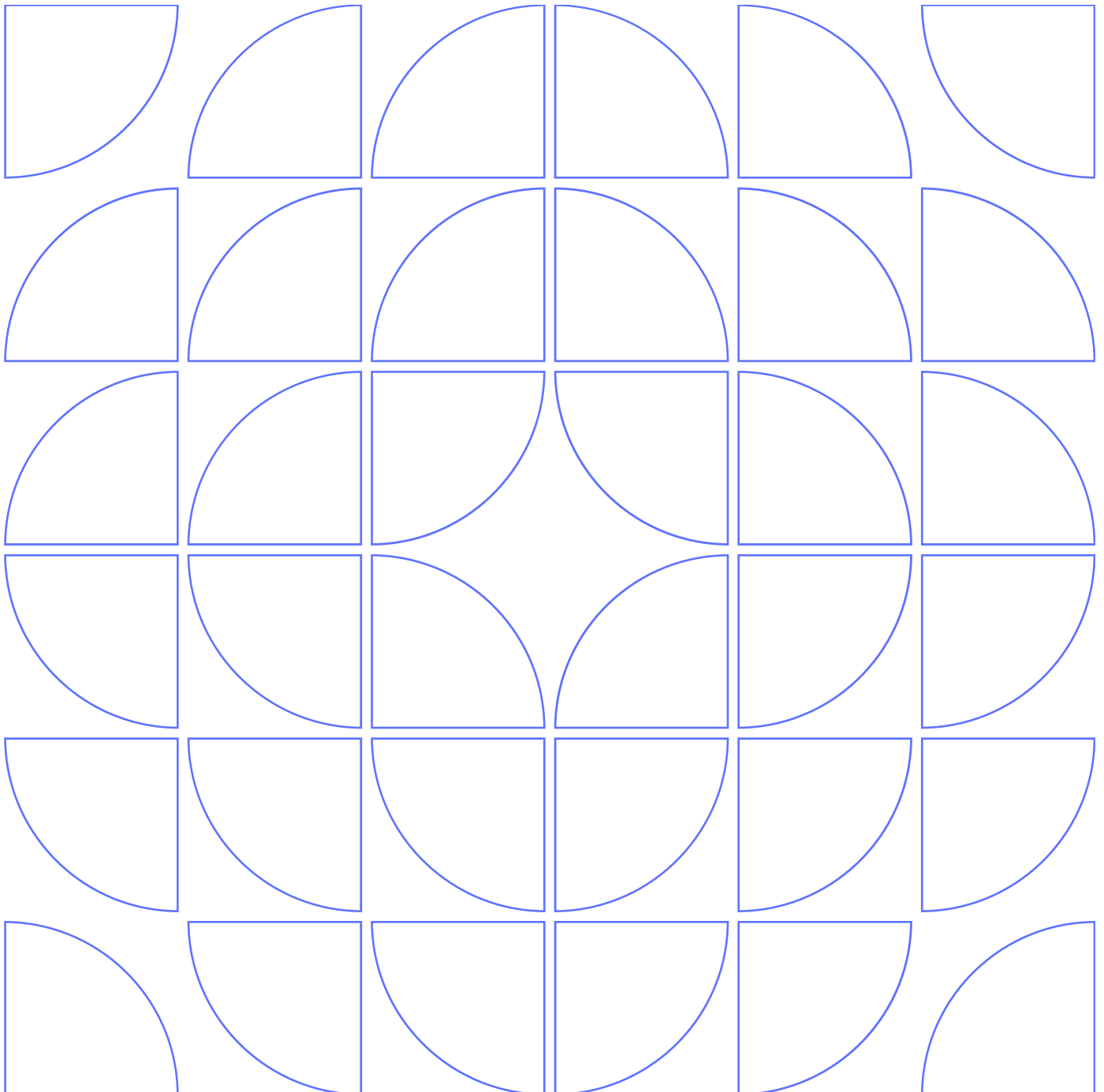


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Definition of sunset and sunrise industries

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I) Elemental oppositions

Common definitions

In commonly employed terms, a clear opposition can be drawn between “sunset” and “sunrise” firms and their sectors. This differentiation is often also called incumbents and new entrants, or declining and emerging industries.

Sunrise industries are commonly expressed as a developing business in the first stages of expansion, showing potential for rapid and sustained growth. They are also characterized by high rates of innovation, both technical and in their new ways to answer society’s needs. This can trigger the interest of investors and in some cases attract high amount of capital funding. However, financing can be variable, either for different firms in the same sector as trends emerge and fluctuate, or (as in the case of the energy transition) where sunrising industries can only access lesser flows of financial investments than their sunseting counterparts. The most common risks associated to sunrise industries is the destabilisation of markets and the creation of financial bubbles.

Sunset industries are generally understood as an older, formerly well-established industry managing large flows of financial and physical assets, which has started its decline and loses investors interest due to changing market and socio-economic conditions. They are also defined as entities coping with decline in various ways to manage their “end-game” [1]. The most common risks associated to sunset industries (even more so in the context of the energy transition), are depreciated and stranded assets (technologies, finances, people and skills), which are liable to disturb wider local and national socio-economic stability and hence delay transitions.

There is also an “in-between” category that has elements of both sunrise and sunset firms and represent the re-examination, experimentation, reorientation and potential reinvention of existing market players. As a specific industry transitions faster and deeper, the lines between (and overlap within) sunrise and sunset firms becomes more blurred [2, 3].

The literature on sunrise vs sunset firms and industries – of which we cite key papers here – is spread out over a range of disciplinary lenses and conceptual approaches. The great bulk of existing literature is on theoretical or conceptual descriptions, supported by a range of case studies. There is far less on empirical analysis and almost nothing on attempts to formally model this strategic interplay.

Interactions

Even though the decline of an industry happens for a number of reasons (e.g. evolving customer preferences), many strands of research have historically placed sunrise industries as the initiators of disruption. The Schumpeterian perspective defined the process where innovative agents generate structural change as “creative destruction”, with related risks to economic and financial stability [4]. Similarly, because the culture of incumbents organisations favour incremental change [5], Christensen’s work on “disruptive innovation” pictures them as vulnerable to the rapid emergence of new entrant’s solutions [6, 7].

Further, incumbents are seen as liable to such destabilisations because of technical and cultural lock-ins, or “business model inertia” [8], with slow responses reinforced by “initial denial or misinterpretation” [9, 10]. Harrigan and Porter also emphasize that sunseting industries’ perception of their position influence on their strategies and ultimately on their performance.

II) Sunset and sunrise in the energy transition

Table 1 summarises the key definitions of sunrise, in-between, and sunset industries.

A systems transformation

The context in which these definitions are set is very important. While early research on decline has pictured industries as facing a limited number of external pressures, in the case of the energy transition, which is embedded in sustainability transitions, sunrising and sunsetting industries are interacting within a broader socio-technical set of systems and sub-systems which are multi-level and co-evolutionary in nature [11] [12]. The transformation is driven by landscape pressures (climate regulations, public concern, global threat) together with niche sunrising technologies, and creates disruption not only for incumbents but for the whole supply, demand and distribution system [3] [13].

In the energy context, incumbent industries are often understood as strongly linked to fossil fuels. They are seen as a “highly consolidated industry, dominated by multinationals and large state actors”, which has attracted large and stable flows of private and institutional investment for decades [14]. By opposition, sunrising businesses are often linked to renewable energies, which possess the rapid growth depicted in the common definition of the concept but are not seen as fully stable on the market, and still deal with relatively low flows of finance.

Political networks

The energy transition is a global transition from large-scale centralised power production, with limited sources often linked to fossil fuels, to diversified systems often linked to renewables. Many incumbents of the energy sector have strong political ties with national governments and/or are nationalised entities. Energy – through the consumption of fossil fuels over many decades – is part of our livelihoods encompassing housing, heating, transportation, and consumption of goods and services. Therefore energy underpinned the structure of our societies, economies, and politics [15]. This has led to many denouncing the lobbying influence of large incumbent companies protecting their “vested interests” [2]. In contrast, sunrising industries can struggle to enter the market and participate in networks of influence [16], even though new energy actors also possess a certain level of support from national governments.

In energy transitions research, as in broader sustainability transitions, the risk is not focused on the sunrising but on the sunsetting firms. In addition of the risk of stranded assets to the wider economy, incumbency is widely seen as likely to slow or inhibit change [17]. For instance, Lowes demonstrates that the heat sector in the UK does promote a vision of “low-carbon gas”, and questions whether incumbents have the power to shape transitions [18]. Similarly, Geels [2] argues that established firms tend to resist, delay or reposition their contribution to transitions, for instance with narratives of “clean coal” produced with CCS. He also emphasizes the notion of power, potentially expressed through lobbying governments, relational networks, media and litigation. Brisbois [16] also pinpoints the pressure sometimes exerted by incumbents to maintain centralised ownership and control, but highlights how, on the other end of the spectrum, renewable energy communities have gained capacity in shifting political power structures as small, new sunrising actors. Others detail that while decentralisation is often seen as a threat to incumbent energy firms, it can also be used as a real opportunity to develop new businesses [6].

Overlapping, interconnected and evolving strategies

Sunset industries can and do adopt strategies that are generally attributed to sunrising industries. Steen and Weaver insist that incumbent have been stereotyped as locked in and resistant, when there is an important heterogeneity in how they respond to pressures and engage in green energy diversification. They highlight how sunsetting industries can contribute and benefit from transitions through technological innovation and resources transfer, offering stability for investors [3]. Turnheim and Sovacool [19] also highlight the

multiplicity of incumbent actors, the variety of their strategies “within and across organisations”, and very importantly the transient nature of their strategic positioning over time. Hess adopt a similar view by detailing how incumbents can gradually adopt different roles, from leading transitions, ignoring them until regulations, through to resisting and mobilizing opposition [20]. Rather than strictly opposing sunset and sunrise, Lindberg et al. [21] offer to look at the “degree” of sustainability and disruption of transition strategies.

There is evidence of incumbents driving sustainability practices and supporting transformative change [19, 22, 23]. Palmié et al. [24] also show that incumbents do not engage in less business experimentation than rising start-ups, but rather pursue different models. For instance, incumbents tend to focus on environmental process innovation to save cost for consumers, while innovators focus on green product innovation for niche “eco-consumers” [25].

Suppliers also can be seen as incumbents or innovators, and firms can be part of unified or diversified types of strategies within industrial sectors and supply chains. Large sunset industries are partnering with innovative new entrants, for instance to develop tailored and efficient carbon capture and storage (CCS) technologies. While the most common sunset versus sunrise technological opposition in the context of the energy transition is fossil fuels and renewables, other technologies - whose categorisation into sunset or sunrise can be challenging - are playing fundamental roles. For instance, the development of green hydrogen and CCS is necessary to help society transition to a low carbon economy, and is currently attracting large research and investment efforts. Yet, if not developed as part of a comprehensive set of approaches, these technologies can also be considered as having the potential to restrain the diffusion of renewables and delay the phase-out of carbon intensive fuels [2].

Some researchers have proposed to look at “coalitions” rather than at specific industries, and whether they are “oppositional or alternative” [26]. Willis [15] looked at policy strategies and identified traps delaying transition, including what she named the “feel good fallacy” (incremental positive change not addressing structural system change) and “stealth strategy” (attempting to decarbonise without people noticing or without consumers/citizens engagement). In the growing research area of political economy of decarbonisation, these ideas that are going beyond sunset and sunrise oppositions could be adapted to help design efficient and tailored industry policies at the local and national levels.

Finally, an important and growing area of transition research is exploring sunset and sunrise dynamics only through the lens of a whole societal transformation. Called the “deliberate decline” of carbon intensive systems, it happens gradually through phase-out (rooted to policy making), divestment (rooted to civil movements and financial risks), and the destabilisation of regimes [27].

| | Sunset | In-between | Sunrise |
|---------------------------------|--|--|---|
| <i>Alternate name</i> | Incumbent/ Declining/ Legacy | Moonlight | New entrant/ emerging/ expanding/ developing |
| <i>Type, size, position</i> | <p>Large multinationals/State actors</p> <p>Well-established/long-term stability</p> <p>Large flows of assets (tech, people, finance, knowledge)</p> <p>Attracted large private and institutional investment</p> | <p>Variable capital funding</p> <p>Multiplicity of actors</p> | <p>Rapid growth</p> <p>Low stability</p> <p>Limited physical and financial assets</p> |
| <i>Political networks</i> | <p>Highly consolidated/organised</p> <p>Lobbying force/vested interest/access to networks of influence</p> <p>Centralised power (technical and political)</p> | <p>Vulnerable to each other (destabilisation or pressure)</p> | <p>Limited influence</p> <p>Struggle to enter and stay in market</p> <p>Distributed power (supply and political)</p> <p>Potential to shift power structures</p> |
| <i>Strategies</i> | <p>Business inertia/ Incremental change</p> <p>Process+tech innovation/resources transfer</p> <p>Stereotyped as locked-in/Delay and resist change / Shape transitions (lead, ignore, resist)</p> <p>Drive sustainability practices/support transformative change</p> <p>Heterogeneous & transient strategies</p> <p>Green energy diversification</p> | <p>Experimentation of new business models</p> <p>Joint ventures between incumbents and new entrants</p> <p>Potential reorientation or even reinvention</p> <p>More common in a faster moving industrial change</p> | <p>High innovation (tech + culture)</p> <p>Product innovation</p> <p>Linked into evolving societal habits and norms</p> |

| | | | |
|--------------------------------|---|----------------------|--|
| <i>Associated Technologies</i> | Fossil fuels/carbon intensive Centralised | Hydrogen/CCS/Nuclear | Renewables Decentralised |
| <i>Associated risks</i> | Stranded assets, socio-economic destabilisation | | Financial bubbles, destabilisation of market |
| <i>Common elements</i> | Landscape and socio-economic pressure | | |

Table 1: Summary of Sunrise vs. In-between vs. Sunset firm/industry definitions

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