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Theme issue contribution

'Good Riddance': Sorting out 'Bad' Residues from the Swedish Biofuel Economy

Marie Widengård

Abstract
This article examines the reclassification of palm fatty acid distillate (PFAD) in Sweden's biofuel sector and its broader implications for the 'good economy'. Initially classified as a residue, PFAD was subject to minimal sustainability oversight, in line with the practice of transforming waste into valuable, sustainable products. However, due to its association with the controversial palm oil industry, PFAD was reclassified as a co-product, subjecting it to stricter scrutiny. Using the concept of 'de-scription', this study explores how this reclassification alters PFAD's sustainability profile, highlighting how classification systems act as valuation tools. It also shows how a subtractive logic (ridding) can help maintain a favourable economic image. The research challenges the assumption that biofuel residues are inherently sustainable and critiques the minimalist regulatory approach of residual governance, which allows materials classified as residues to escape rigorous oversight.

Keywords: valuation; classification; residue; biofuels; good economy; riddance

Marie Widengård, School of Global Studies, University of Gothenburg

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Introduction

Recent shifts towards sustainable energy solutions have placed biofuels, particularly those derived from residues and wastes, at the forefront of policy and industrial agendas. These biofuels are promoted as 'good' alternatives to fossil fuels, addressing the issues of land and food competition while also reducing waste (Humalisto 2014; IEA 2022; IRENA 2016). This approach lauds the transformation of leftovers into profitable products, epitomising 'doing good while doing well financially'. However, rather than viewing the good economy as a straightforward concept with purely positive social and environmental outcomes, a more critical perspective examines how economies and versions of 'the good' are intertwined. It asks what it takes to perform the good and how materials are expected to embody and deliver this good (Asdal et al. 2023).

This article critically examines how 'good' residues are valued within the biofuel economy, focusing on the Swedish case of palm fatty acid distillate (PFAD), a by-product of palm oil refining. While 'by-product' is often used generically, the technical classification of a material – whether as a residue, waste, co-product, or product – plays a crucial role in determining its value within the biofuel sector. In Sweden, PFAD was initially classified as a residue, exempting it from strict sustainability scrutiny and making it attractive to biofuel producers. However, due to its connection to the environmentally and socially damaging palm oil industry, critics began to question this favourable classification. They called for its reclassification as a co-product, a move that would subject PFAD to stricter scrutiny and potentially remove it from the biofuel mix.

The central issue of this case study is how the classification of PFAD as either a 'residue' or a 'co-product' influences its valuation, which oscillates between being seen as part of a 'good' sustainable biofuel economy and the 'bad' palm oil industry. By analysing the two-year process that led to PFAD's reclassification in 2019, this study highlights the pivotal role of classification systems as tools of valuation. The analysis demonstrates how PFAD's value shifts dramatically based on its classification, directly affecting its sustainability credentials and marketability as a biofuel component. This illustrates that classifications are not merely administrative acts but are central to the valuation processes that define materials and influence how economies are perceived. Madeleine Akrich's (1992) concept of 'de-scription' provides a powerful lens for analysing how materials like PFAD are contested and redefined. Focusing on the 'script' of a material – its expected uses, sustainability profile, and economic role – allows us to observe how it is reshaped through debates, regulations, and practical applications. This redefinition process reveals the interactions between different values, evaluators, and valuation tools.

The exploration of PFAD's reclassification not only sheds light on the practices of classification systems but also enriches the field of valuation studies by examining how the 'good economy' is constructed and maintained. By demonstrating how classification systems serve as tools of valuation, the research challenges the oversimplified categorisation of biofuel residues as inherently 'sustainable' and calls for a deeper examination of the factors that shape these labels. The subsequent narrative details how Sweden strategically excluded 'bad' palm residues while selectively retaining 'good' domestic residues within its biofuel industry. I describe this process as 'good riddance' – the intentional removal of problematic substances for the public good. This aligns with Emma Greeson's concept of the 'subtractive logic of ridding' (2020), which involves sorting and discarding materials deemed undesirable and retaining those that contribute positively to environmental or economic goals. This strategy not only removes items but systematically reduces the presence of problematic materials, thereby improving the environment or context in which it occurs. In this article, I highlight that the subtractive logic raises critical questions about the fate of the sorted residues – the leftovers. Such issues directly tie into residual governance, as defined by Gabrielle Hecht (2023), which is a type of governance that deliberately keeps regulation minimal, allowing residues to sidestep stringent checks. This form of governance is evident in European and Swedish biofuel regulations, where materials classified as residues avoid rigorous scrutiny. Viewed as subtractive, this simplification strategy strips away the complexities and potentially negative aspects of these residues from regulatory oversight. I argue that examining residues, subtraction and classification offers a lens for critically examining the 'good economy', revealing the complex and often contradictory mechanisms that sustain it.

In the next section, I develop this critical perspective on the 'good economy', connecting concepts such as subtractive value production, residual governance, and classification systems under the overarching theme of 'good riddance'. This theoretical framework lays the groundwork for the case study methodology, which details the specific materials and data sources that inform this research, including an in-depth analysis of the Swedish biofuel context and the regulatory dynamics that shape the classification and valuation of residues. The following sections explore the PFAD controversy, tracing the pivotal two-year reclassification process and unpacking the strategic motives of key stakeholders as well as the design of classification systems. The analysis concludes with a discussion of the findings, framing them as a form of 'good riddance', and offers reflections on how the concepts of residues and classification deepen our understanding of the 'good

economy', while proposing pathways for future research and policy development.

'Good riddance': critical perspectives on the good economy, subtractive value production and residual governance

Subtractive value production shifts the focus from value addition to managing and repurposing materials cast aside, involving processes where value is generated by discarding or transforming residues, waste, or secondary materials (Greeson 2020). In the context of the good economy (Asdal et al. 2023), this approach emphasises sustainability and efficiency by transforming waste into useful products or by-products. Examples include second-hand outlets, recycling, upcycling, and managing industrial residues to create new products. Subtractive logic involves creating value not by adding but by reducing and sorting. Greeson (2020) explored this concept in the second-hand market, highlighting how books undergo various rounds of sorting, categorising, and arranging to create value. The subtractive logic can also be found in various sectors, such as the scrap economy, which thrives on breaking down materials (Gregson et al. 2010; Laser 2020), and the construction sector, which creates value by demolishing structures, sometimes removing 'bad' residents in the process (Easterling 2003; Halauniova 2022). While industries claim to have 'designed out waste', this process often introduces new, unknown, and inherently problematic repercussions (Zavos and Pyyhtinen 2024: 4).

Despite their tangible presence, residues are often overlooked and neglected due to their perceived insignificance. Residue refers to the remainder, such as the waste left after recycling, traces of chemicals left after cleaning, or by-products left after processing the main product. It is 'the matter left behind by the main event' (Hecht 2023: 28) or 'matter that is not supposed to matter' (Boudia et al. 2018: 170). The growing importance of understanding residues has led to emerging literature exploring their properties, governance, and implications. This literature often focuses on detrimental residues like toxic substances and greenhouse gases, examining their impact on health, environment, and policy frameworks (Boudia et al. 2022; Hecht 2023). Hecht's (2023) study on mine residues shows that managing discarded materials involves simplification and exclusion of environmental costs, sidelining pollution-related facts and treating residues as insignificant by-products requiring minimal attention. This creates a scenario where residues persist and potentially cause harm without being adequately monitored or addressed. Laws and regulations may permit residues to remain under the radar by focusing on threshold values that fail to capture the full extent of their presence and impact. The accumulation of fossil fuel residues confronts societies with long-lasting ecological

and existential damage (Folkers 2021). Subtractive value production is reflected in the way carbon dioxide is increasingly conceptualised as waste. Processes such as carbon capture, utilisation, and storage transform this waste into profitable ventures by integrating carbon management into economic cycles (Buck 2020). This approach emphasises sustainability by repurposing carbon emissions, thus aligning with broader environmental goals while creating economic value.

Discarded items often carry both environmental 'bad' and economic 'good' values, having 'a double—plus and minus—value charge' (Doganova and Karnøe 2015: 231). Items that people discard but are then revalued and given new life are often seen positively (Gregson and Crang 2015). However, a comprehensive valuation perspective acknowledges that 'good' can be constructed in many ways, recognising diverse modes and registers of valuing goodness (Heuts and Mol 2013). For instance, a 'good mother' may hold on to children's clothes and toys or get rid of them in caring ways (Gregson 2007). While being 'a good sorter' has become a central virtue, it also entangles ethics and the economy in new ways (Hawkins 2001). 'Riddance' can perpetuate consumerism by making room for new items, encouraging continuous cycles of consumption and disposal. What is 'good riddance' or not varies depending on perspectives, often leading to conflicting perceptions. Dumpster divers, for example, see value in rescuing discarded matter, claiming to reduce waste and challenge wasteful consumerism (Lehtonen and Pyyhtinen, 2020). However, their actions can also lead to legal disputes when waste is viewed as a resource by proponents of a circular economy, illustrating the clash between different valuation systems (Barnard 2011; Gregson and Crang 2015).

Valuation processes are crucial for understanding how stakeholders assign significance and worth to various materials within an economic system. These materials acquire value through complex processes, involving multiple values, schemes, and evaluators (Foster 1997; Bigger and Robertson 2017; Bracking et al. 2019). Different stakeholders may use various valuation tools to advocate for or against certain governance approaches, influencing how materials are classified and managed. Asdal et al. (2023) highlight that tools of valuation are essential for understanding how economies and notions of good are interlinked, especially in contexts like the bioeconomy where traditional economic assessments intersect with ethical and sustainable concerns. These tools range from economic models integrating environmental impacts to narrative strategies shaping public and policy discourse.

Classification systems are also important valuation tools. Bowker and Star (1999) argue that these systems do not merely organise reality but are outcomes of norms and moral principles, highlighting that

classification is about deciding what counts and what doesn't. For example, states can adjust classification systems to boost industry opportunities and reclassify waste into renewable resources to make waste problems disappear (Behrsin 2019; Behrsin, Knuth, and Levenda 2022). Similarly, mining heaps have been reclassified from 'worthless residues' to 'valuable secondary resources' (Bleicher, David, and Rutjes 2019), and profit can be derived from waste transformation, redefining discarded items beyond mere disposal (O'Brien 2012). These classifications carry significant implications for how materials are assessed, reflecting both technical definitions and strategic interests of stakeholders.

The classification debate surrounding PFAD critically distinguishes between categories such as waste, residue, co-product, and product. The term 'by-product' is often used generically for substances that are not the main output, yet the specific technical categories and their sub-categories are essential in the biofuel economy. These classifications are pivotal because they not only influence the semantic understanding of materials but also determine how these materials are valued in sustainability terms. For instance, products and co-products must adhere to comprehensive sustainability standards, and allocation rules play a crucial role in deciding how carbon footprints are apportioned between these categories. The specific rules governing carbon accounting and sustainability criteria for the category 'processing residues' will be detailed in the upcoming sections of this paper. Within the European Union, the responsibility to classify substances like PFAD rests with individual member states. The following empirical study from Sweden offers an in-depth examination of these classification dynamics, uncovering the tensions and strategic decisions that impact the sorting and valuation of PFAD within the biofuel sector.

Examining residue valuation: methods and materials

This study focuses on a time in Sweden when the definition of residues was being updated to match new EU regulations due by September 2017. The debate over PFAD and its classification stirred up this process. This provided a rich context to explore how residues are valued. Given the specificity of PFAD, an online search was feasible. The regulatory process and parliamentary debates around PFAD were publicly available through the Swedish government, allowing access to diverse stakeholder opinions. For analysis, I selected 22 texts from 2016 to July 2019, when the reclassification of PFAD went into force. These texts included online publications by environmental organisations, politicians, and fuel companies, as well as remittances, parliamentary debates, regulatory drafts, and final legislation (e.g., GoS 2017; Riksdagen 2017; The Environment and Agricultural

Committee 2017). Environmental organisations and the Green Motorists used online media to express their views, and eight texts were selected for their focus on residue classification (Sveriges Natur 2016a, 2016b, 2017; Greenpeace 2017; Gröna Bilister 2017, 2018, 2020; WWF-Sweden 2020). Industry perspectives were captured through trade magazine articles and texts from the 'Fossil-free Sweden' platform and representatives from the biofuel and forestry industries (Bioenergitidningen 2016, 2018; Neste 2020; Riksdagen 2017; Skogsindustrierna 2018). Political perspectives were gathered from blog posts (Nordin 2017; Tovatt 2017) and media coverage, including an article from a prominent Swedish newspaper (Dagens Nyheter, October 31, 2020). Excerpts were coded and translated from Swedish, with attention to how PFAD and residues were perceived, defined, and revalued by various actors.

Akrich's (1992) concept of 'de-scription' is useful for analysing how controversies and social contexts redefine a material's place in the economy. If a script prescribes what a category should contain, then de-scription involves the process by which these classifications and materials are stripped of their initial roles and redefined through social, economic, and political contexts. This re-scription often emerges from controversies, challenging initial intentions and revealing the dynamic nature of material and category construction over time.

Sorting out PFAD and the value of residue in Sweden

The PFAD controversy emerged in 2016 when environmentalists discovered significant amounts of PFAD in Swedish biofuels. Until then, the specifics of waste content and origin were not required in fuel producers' reports, allowing PFAD to go unnoticed. Public opinion in Sweden was divided: some defended PFAD as a benign residue, while others pushed for its reclassification as a co-product, which would impose stricter regulations and potentially exclude it from the biofuel mix. By narrating the two-year-long reclassification process, this section demonstrates how PFAD and the concept of residue were simultaneously de-scribed (Akrich 1992). To understand this, it is essential to first explore how processing residues were valorised, that is, how their values were enhanced under Swedish and European biofuel regulations.

Valorising residues through biofuel regulation

Valorising residues in this context means assigning value to residues by integrating them into the biofuel economic system as valuable resources. This process begins with defining what constitutes a residue.

Following changes in the EU's Renewable Energy Directive (REDII 2018/2001/EU 2(43)), Sweden had to adopt a definition stating that a residue is 'a substance that is not the end product(s) that a production process directly seeks to produce; it is not a primary aim of the production process, and the process has not been deliberately modified to produce it'. The inclusion of the phrase regarding deliberate modification was intended to prevent fraud, highlighting the high value placed on residues within the biofuel economy. In Sweden, this addition was accepted without much controversy. However, the revision coincided with a broader debate on what constitutes a 'proper' residue, particularly in light of the PFAD issue. A new provision was introduced, allowing the government or an appointed authority to issue further regulations defining what qualifies as a residue.

This regulatory negotiation was influenced by the significant advantages that residues received under biofuel legislation, such as exemptions from full-chain sustainability criteria and carbon accounting, which positioned residues favourably in sustainability rankings compared to crop-based biofuels. The EU REDII, which Swedish law must adhere to, is particularly lenient on processing residues. While crop-based biofuels must account for greenhouse gas (GHG) emissions throughout the entire production chain, processing residues only need to account for emissions from the point of their collection at processing plants. They are exempt from land use criteria and the EU's Indirect Land Use Change (ILUC) factors. Although palm oil is identified as high risk and slated for phase-out by 2030 in the EU biofuel market, materials classified as processing residues from palm oil production escape these ILUC factors.

These simplified measures and differential treatments position residues higher in sustainability rankings compared to crop-based biofuels. Regulatory advantages have created a lucrative market for residues, including those eligible for the 'double market', where certain residues and wastes listed in EU REDII's Annex IX list A can count twice towards renewable energy targets due to their substantial carbon reduction potential. This multiplier mechanism makes these materials highly desirable, as their energy content contributes doubly to renewable energy goals. Additionally, there is a specific minimum target for advanced biofuels, including those derived from waste and residues.

By applying the perspective of residual governance (Hecht 2023), we can understand this approach as a minimalistic and simplifying governance style. It showcases how the biofuel regulation externalises residual impacts to minimise administrative and economic burdens. With residues in the biofuel economy, the appearance of a sustainable economy can be maintained. For instance, as a residue, PFAD can reduce greenhouse gas emissions by 90% compared to conventional

fossil fuel-based diesel. In contrast, when defined as a co-product, the emission savings are much lower: life-cycle assessments range from 11.44 gCO2eq/MJ to 79.8 gCO2eq/MJ, the latter being well above the EU requirement for carbon emission savings to qualify as sustainable biofuels (Cho et al. 2013; Johnson 2017; Xu, Lee, and Wang 2020). This variability underscores the importance of classification in carbon accounting.

Given this preferential treatment for residues, one might expect clear definitions of what constitutes a residue, but this is far from the case. What is defined as a residue at the EU level may differ in member states and other countries, leading to varying and sometimes contradictory classification systems. Practitioners, including regulators, industry stakeholders, and certification bodies, frequently grapple with the distinctions between residues, waste, co-products, and main products. This ambiguous situation provides one of the few opportunities for EU member states to shape biofuel regulations. Sweden leveraged this flexibility to define what constitutes a residue within their national context, but it was preceded by long debates.

De-scribing PFAD: residue or co-product

The issue of PFAD divided public opinion in Sweden. Proponents argued that PFAD, as a residue, did not drive palm oil production, affect demand, or cause deforestation. Opponents contended that PFAD and palm oil were produced together and had similar drivers and negative impacts. Environmental organisations, including Greenpeace and WWF, campaigned against PFAD, citing its negative climate effects and difficulties in tracing its origins (Greenpeace 2017; WWF-Sweden 2020). Campaigns against PFAD included stickers at petrol stations, online communication, and investigative articles. Questions of what a residue should be or not moved from the technical, expert sphere to the fuel consumer. Issues such as deforestation, habitat loss, fires, greenhouse gas emissions, and human rights abuses were highlighted. The Swedish Society for Nature Conservation (SSNC) actively campaigned against palm oil and its by-products in fuels, hoping to 'sanitise' the industry (Sveriges Natur 2016b). SSNC and the Green Motorists used 'naming and shaming' tactics to pressure companies to avoid PFAD-based biofuels.

The Green Motorists' campaign 'Fossil freedom at any cost?' criticised the easy availability of palm oil and its by-products and the resultant environmental damage. They argued that fuel companies could buy PFAD without worrying about its origin from uncertified or illegal palm plantations (Gröna Bilister 2017). They estimated that 15–20% of all PFAD produced globally was used in Sweden, claiming that the Swedish biofuel transition was 'doped with PFAD' (Gröna Bilister 2018). The cheap availability of PFAD, coupled with the growing

demand for biofuels, created what the Green Motorists described as a 'dangerous mix'. As PFAD, classified as a residue, was automatically assigned a low climate impact, it was 'by far the easiest and cheapest way for companies to fulfil the obligation' to reduce carbon emissions, referring to a regulation which was to be introduced on 1 July 2018. Before this obligation took effect, it was crucial to 'disconnect the fossil-free transition from one of the most valuable natural areas on Earth' (Gröna Bilister 2017). This situation illustrates the concern that a supposedly good economy could turn into a bad one, if not governed in proper ways (Asdal et al. 2023).

For the Green Motorists, a concrete step in that direction was to reclassify PFAD so it no longer counted as a residue and did not travel the 'priority lane' from Southeast Asia into Swedish diesel cars. They argued that Sweden would otherwise be 'complicit in destroying the reputation of biofuels for good, and the market will die – if it turns out in a few decades that our demand for biodiesel was behind the devastation of the last rainforests in Southeast Asia'. Pretending that palm biofuels could be used while protecting rainforests through regulation and certification was, according to them, like steering a horse carriage while 'trying to avoid trampling delicate flowers in its path'. Instead, Sweden would do biofuels 'a favour' by limiting the inflow of palm oil and PFAD until the industry was 'rehabilitated' (Gröna Bilister 2017).

To underscore how 'bad' PFAD was, it was compared against what Swedish actors defined as 'good' residues, particularly those from the domestic paper and pulp industry, such as 'tall oil' (pine oil). According to the Green Motorists, the influx of cheap PFAD undermined investments in 'slightly more expensive but more sustainable raw materials for renewable diesel, such as residual products from the Swedish forestry and pulp industry'. They hoped that residues from this industry would be able to compete if PFAD was reclassified. The Green Motorists argued that Sweden's innovative industry was promising, but it needed 'rules of the game that make it competitive' (Gröna Bilister 2017). They expected that a reclassification would make PFAD 'financially impossible in the market' (Gröna Bilister 2018). An anticipated consequence was that the carbon reductions would drop from 90% to 65% when emissions from the entire chain were considered (Bioenergitidningen 2018).

Sweden's biggest fuel company also argued against PFAD, stressing the need to avoid replacing one environmental problem with another. The industrial platform 'Fossil-free Sweden' generally supported reclassification, considering PFAD a cheap and unsustainable competitor. Companies without stakes in domestic production were more hesitant, arguing that stopping PFAD would increase palm oil demand (Riksdagen 2019). International players also intervened. For example, Finland, representing a major PFAD producer, lodged

complaints with the European Commission, causing delays in the reclassification process (Sveriges Natur 2018).

Public debates on PFAD's value intersected with party-political disputes. The ruling Social Democrats and the Green Party, supported by the Left Party and environmental organisations, opposed labelling PFAD as a highly sustainable residue. They argued that reclassifying PFAD would prevent market confusion and improve transparency by tracing PFAD back to its palm oil origins. The Green Party emphasised the economic benefits for Swedish industries, predicting multi-billion investments (Tovatt 2017). Conversely, opposition parties worried about the economic fallout of losing a major biofuel component and potential increases in palm oil-based HVO (Hydrotreated Vegetable Oil) and fossil fuels (Nordin 2017). The Minister of the Environment acknowledged that losing PFAD could lead to higher palm oil use, which was undesirable. Nevertheless, the government believed that removing PFAD was necessary before introducing a new regulation aimed at increasing biofuel usage. This decision was grounded in the expectation that PFAD would be replaced by biofuels from domestic production which had a better climate performance (Sveriges Natur 2016a).

Most actors eventually agreed that PFAD should be sorted out from the residual category. The challenge was how to achieve this within the classification system without significantly disturbing the biofuel economy. The reclassification was slowed under the pretext that Swedish residues risked being thrown out in the same process if the regulatory change was rushed (Nordin 2017). It was deemed important to avoid the unintended consequence of excluding Swedish residues along with PFAD. Opposition parties delayed the reclassification for a year, arguing that rushing the change would negatively impact the biofuel sector. Despite these delays, the reclassification process to exclude PFAD from the biofuel mix was ultimately initiated.

Re-scription: reclassifying PFAD by redefining residue

When the Swedish Parliament decided to exclude PFAD from the residual category, a significant issue remained: establishing clear principles for its reclassification. Any attempt to change how PFAD was classified (from a residue to a co-product, for instance) had to follow the rules and not be seen as reversed cherry picking. As I mentioned, a new provision had been introduced, allowing the government or an appointed authority to issue further regulations on what constituted a residue. Initially, the government proposed that a substance should be considered a residue if the production process was optimised for other substances and its economic value was low compared to the main product. However, 'low' was considered too

vague, prompting calls for greater clarity (JP 2017). The Energy Agency proposed a more precise economic criterion: a residue cannot have a market value higher than 40% of its main product. Although many actors deemed this criterion arbitrary, it was accepted because it disqualified PFAD, which sometimes reaches 90–95% of the market value of palm oil.

Consequently, the Swedish Parliament (2011: 1088) amended the regulation on sustainability criteria for biofuels, stipulating that a substance is not a residue if 'during the last two years or the shorter period it has been on the market, its average selling price per kilogram exceeds 40% of the average selling price per kilogram of the substance the process is normally optimised for'. Figure 1 illustrates the valuation tool in the form of a decision-tree, initially introduced by the Energy Agency to guide biofuel producers.

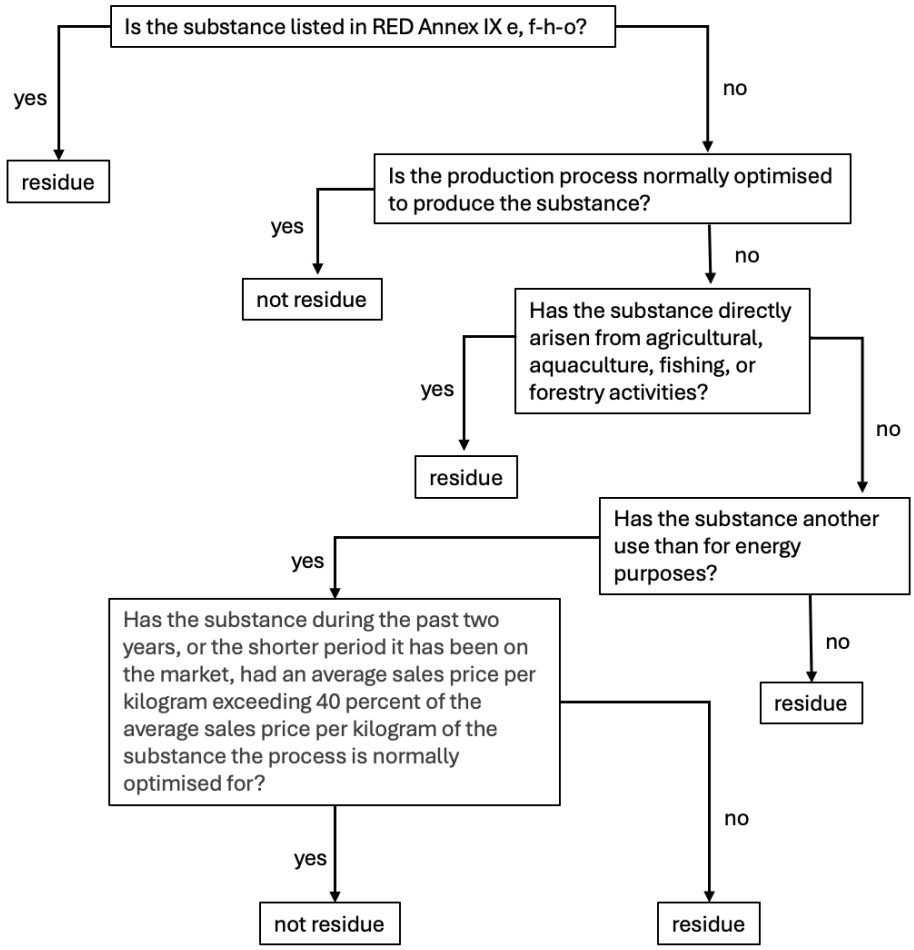

Figure 1: What counts as residue according to the Swedish regulation (Swedish Parliament 2011:1088, 3a) on sustainability criteria for biofuels.
Source: The decision-tree was developed by the Energy Agency (translation by author).

The new definition meant that, as of 1 July 2019, PFAD was no longer classified as a residue, losing its high climate benefit attributed to the category. Instead, it had to meet the same certification and traceability requirements as palm oil. As a co-product, Sweden anticipated that PFAD would become less attractive to fuel operators due to stricter carbon accounting and ILUC factors. After all, the reclassification aimed to make PFAD financially unviable and remove it from the Swedish market. By changing the classification, Swedish actors wanted to influence the market in favour of more locally produced and environmentally friendly biofuels. It is noteworthy that Sweden decided that its own tall oil should always be seen as a residue (Energimyndigheten 2019: 47), even if the forest industry declared that it, too, might generate a high price (Skogsindustrierna 2018). The Swedish rationale was that it is listed as a residue in the EU directive; however, so were palm oil mill effluent and empty palm fruit bunches, which the Energy Agency removed from the residual category together with PFAD (Energimyndigheten 2019: 47). Although PFAD suppliers subsequently tried to comply with the full sustainability criteria, Sweden declared palm oil and PFAD to be a high ILUC risk, effectively banning its use unless proven otherwise by complicated means (Energimyndigheten 2022).

These interactions highlight the role of critique and controversies in shaping what is considered 'good'. By analysing the perspectives and actions of various stakeholders – environmentalists, industry actors, and policymakers – the case reveals the conflicting interests and values at play. Despite their differing motives, these groups collectively pushed for classifications that best aligned with their own economic, environmental, or political goals. This convergence of efforts demonstrates how diverse agendas can come together to drive regulatory changes. As Stark (2009) and Doganova and Karnøe (2015) suggest, environmental and economic values are often juxtaposed, maintaining a state of dissonance where both are actively considered and remain in tension.

Understanding 'good riddance' in the context of PFAD

The reclassification of PFAD from a residue to a co-product exemplifies the process of 'good riddance', a strategy aimed at maintaining Sweden's biofuel economy as a leader in both environmental sustainability and ethical business practices. By selectively removing or redefining elements considered problematic, such as PFAD, Sweden sought to uphold its image of producing biofuels that meet stringent sustainability standards while also adhering to broader ethical concerns, such as minimising harm to the environment and avoiding associations with industries that have

negative social or ecological impacts. This process illustrates how perceptions of sustainability and ethics are not fixed but are actively shaped through strategic management of classifications and public discourse.

Sweden's decision to exclude PFAD from its biofuel mix underscores the dual nature of 'good riddance'. On the one hand, it represents an effort to enhance sustainability and uphold ethical standards by eliminating PFAD due to its environmental concerns. On the other hand, this exclusion serves economic interests by supporting domestic industries and prioritising local residues over imported alternatives. This approach reflects Sweden's goal of improving environmental standards ('doing good') while simultaneously leveraging these actions to block competition and promote domestic economic interests ('doing well financially'). This demonstrates the flexibility and subjectivity within classification systems, and the significant economic, environmental, and political implications they entail.

The removal of PFAD emphasises that residues are not inherently 'good'; their value is contingent on regulatory definitions and market dynamics. This becomes evident when comparing Sweden's approach to that of other countries. For instance, the UK sets an economic threshold for classifying substances as residues at 15%, categorising both PFAD and tall oil as 'products', meaning they follow the same rules as co-products (UK Government 2018). This comparison highlights the variability and subjectivity of classification systems, showing how Sweden's reclassification aligns with its vision of a sustainable biofuel economy by excluding contentious residues like PFAD while favouring domestic ones such as tall oil. These actions demonstrate how classification systems can be manipulated to influence perceptions of value and legitimacy within the biofuel market, further emphasising their arbitrary nature.

To reclassify PFAD, its initial designation as a residue had to be 'de-inscribed', reshaping its identity and prompting a re-evaluation of the broader category of residues. This shift from residue to co-product was followed by 're-scription', significantly diminishing PFAD's role within the biofuel economy. Despite this scrutiny, the process ultimately 're-inscribed' the management of residues within the biofuel sector, effectively obscuring governance mechanisms once again. The residual category is treated as 'unproblematic in itself', akin to how the 'bio' in biofuels was once uncritically accepted as inherently beneficial within the discourse of the good economy (Asdal et al. 2023: 18). This re-inscription exposes the risks of residual governance, where potential problems are concealed through regulatory loopholes. For example, the categorisation of tall oil as a residue remains unchallenged despite its potential environmental impact. This case exemplifies how residual governance, when critically examined, avoids addressing the complexities and contradictions of the biofuel sector.

In essence, the case of good riddance in PFAD's reclassification shows how selective classification and reclassification can align with broader economic and environmental narratives. By reclassifying PFAD, Sweden met its sustainability goals while strategically favouring local industries and residues. This case also illustrates how residues like tall oil can bypass stricter regulations and maintain their 'good' status through strategic regulatory manoeuvring. The balance between exclusion and retention underscores how national interests shape the 'good economy', with classification systems playing a key role in the sorting and valuation of materials.

Conclusion

What does the reclassification of substances like PFAD reveal about the good economy and valuation processes? This analysis demonstrates how classification systems, as tools of valuation, profoundly influence perceptions within the biofuel industry. Residues like PFAD are praised for their potential to mitigate environmental issues such as waste and carbon emissions. Yet, their favourable valuation often arises from strategic classifications and minimalist governance, potentially masking significant impacts. The decision to label a substance as a residue or a co-product impacts its regulatory oversight, market value, and public perception significantly. These outcomes hinge on the strategic interests of those in power, emphasising that valuation is contingent and shaped by a mix of economic, environmental, social, and political factors. This dynamic reveals the complex interplay between material properties and their broader socioeconomic contexts, underscoring that such decisions are deeply entangled with regulatory and economic agendas.

The subtractive logic demonstrated here suggests that value is not only generated through inclusion but also through exclusion. The removal of PFAD from the residue category highlights this point; however, the story of PFAD itself underscores the complexity of value production. PFAD is a versatile commodity used in biofuels, oleochemicals, and animal feed. Unlike traditional linear value chains, where products follow a straightforward path from raw material to finished product, PFAD exemplifies a 'flex commodity' that moves through intricate value webs (Bastos Lima 2018). This aligns with the concept of 'ecologies of valuation' (Greeson 2020), in which the worth and utility of materials are continuously re-evaluated and transformed. These industrial value webs, particularly within the green and circular bioeconomy, reveal the interconnectedness of different sectors, where subtractive production ensures that residues and by-products are not wasted but reintegrated into the economic cycle. However, tracing these value webs is a complex task, making it difficult to identify where valuation processes begin and end, and who is using which tools

of valuation. This study has only mapped a portion of this intricate narrative.

As materials enter the biofuel economy, the processes of naming, sorting, and classifying them become increasingly important. Materials labelled as residues are often prioritised over food oils and grains. By examining how residues are repurposed and integrated into value webs, we can gain a deeper understanding of the complexities involved in their valuation. While these residues differ from toxic ones that persist in the environment, the similarity lies in the way that labelling something as a residue can allow it to bypass rigorous regulatory scrutiny.

Ultimately, the case of PFAD serves as a reminder to critically evaluate claims of sustainability and goodness. The use of residues may align with the discourse of the good economy, but closer scrutiny often reveals hidden contradictions. Biofuel policies may assert that the sustainability of residual materials has been 'assessed', when in fact, it is often assumed rather than proven. This underscores how residual governance shapes what is considered beneficial or harmful, allowing damaging practices to persist if their impacts are obscured or relocated. Threshold limit values, such as Sweden's 40% rule, imply that substances below a certain level of concern may be disregarded, leaving them in an ambiguous 'in-between' state where they exist in the environment but remain unrecognised or unregulated (Alexander and Sanchez 2019; Boudia et al. 2022: 120). These materials oscillate between acknowledgment and neglect, revealing gaps in regulatory frameworks. Biofuel residues may go unnoticed, only to have their long-term environmental impacts recognised later. For instance, the emissions from burning residual biofuels, including carbon dioxide, leave lasting environmental consequences.

To build a trustworthy economy, greater transparency is needed in how residues are managed. Accountability for the residual impacts of materials is essential. The PFAD case emphasises that developing a genuinely sustainable biofuel economy requires ongoing scrutiny and a commitment to addressing the complex challenges of residue management. The growing controversy around Sweden's tall oil residue presents a relevant next step for further investigation.

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Marie Widengård holds a PhD in Environmental Social Science and is currently a researcher at the School of Global Studies at the University of Gothenburg. Her work examines the politics of nature and resource governance, with research spanning the Swedish fuel transition, rights of nature, and the entanglements of extraction, conservation, and Indigenous rights in Jamaica. She is also co-curator of Sweden's Transformed World Exhibition 2045, a digital public exhibition hosted at fossilfreenation.se.