The promise of transforming waste streams with small economic value into valuable products makes resource recovery technologies in bio-based production processes an attractive proposition. However, the use of resource recovery technologies in industrial applications is still minimal, despite its wide use in closely related processes such as dairy production. In this paper, a perspective on the role of resource recovery in bio-based production processes is provided through reviewing the past practice and identifying the benefits, opportunities and challenges of introducing resource recovery technologies to industrial bio-based production processes. The role and importance of economics, technology readiness and socio-environmental impacts of resource recovery in successfully implementing resource recovery technologies in industrial bio-based production processes is also discussed. Finally, based on the insights gained in this review and assessment of resource recovery technologies in the domain of bio-based production processes, an informed opinion and perspective is provided. The current state of resource recovery and the shortcomings when developing practical resource recovery applications in bio-based production processes are discussed.