重用模式：塑料污染治理的核心战略与事实依据

一，为何重用模式是治理塑料污染的解决方案

章节概述：

当前塑料经济依然深陷高产量、高废弃的线性模式。回收虽重要，但远不能独自扭转塑料污染与资源浪费加剧的趋势。近年来，全球经济整体循环率甚至出现倒退，超过九成的原生材料（含原生塑料）在一次性使用后即被废弃，凸显传统末端治理路径的局限性。面对这一危机，重用模式提供了从源头解决问题的必要手段。联合国环境规划署、世界经济论坛等权威机构将重用定位为缓解全球塑料污染的关键策略；科学研究亦证实，从全生命周期看，重用系统在环境效益上显著优于一次性模式，是应对资源枯竭与环境污染的根本性解决方案。线上零售、即时配送与外卖等新兴业态的迅速扩张正在推动包装废弃物激增，这也使得重用模式成为更迫切的商业可持续转型方向。

事实列举：

- 事实名称： 全球经济整体循环率下降凸显资源利用危机
  网页链接： https://www.circularity-gap.world/2023
  事实介绍： 根据影响力组织“循环经济”（Circle Economy）发布的《2023 年循环差距报告》，全球经济的循环率已从 2018 年的 9.1%下降至 2023 年的 7.2%。这意味着全球经济对原生资源的依赖性不降反升，超过 90%的材料在一次性使用后被废弃，加剧了资源枯竭和环境污染的压力。报告强调，推广重用等循环经济策略对于扭转这一趋势、实现可持续发展至关重要。
- 事实名称： 世界经济论坛：重用模式是解决塑料危机的关键
  网页链接： https://www3.weforum.org/docs/WEF_Scaling_Reuse_Models_2023.pdf
  事实介绍： 世界经济论坛在 2023 年发布的《规模化重用模式：标准化测量指南》报告中指出，重用是解决日益严重的塑料污染危机的最有力的市场转型之一。报告强调，全球每年生产的塑料中有一半用于一次性应用，而回收率极低。将全球 20%的一次性塑料包装转换为重用模式，预计将带来 100 亿美元的商业机会，并显著减少环境中的塑料垃圾。
- 事实名称：UNEP 报告：《切断根源：全世界如何终结塑料污染、创建循环经济》（Turning off the Tap）
  网页链接：https://www.unep.org/resources/turning-off-tap-end-plastic-pollution-create-circular-economy
  事实介绍：联合国环境规划署（UNEP）2023 年发布的这份报告指出，要终结塑料污染，必

须从线性经济向循环经济转型，其核心在于加速三大市场转变：重复使用（Reuse）、回收利用（Recycle）以及调整方向和多元化（Reorient and Diversify）。报告明确预测， 通过推广可重复使用的包装（如可回充瓶、散装分发器、押金退还系统等），到 2040 年可以实现 30%的塑料污染减量。相比之下，回收利用预计贡献 20%的减量，替代材料（调整方向）贡献 17%的减量。由于原生塑料的生产和转换占该行业温室气体排放的 80%以上，通过“重复使用”直接减少对原生塑料的需求，是所有路径中环境效益最高、温室气体减排潜力最大的措施。

- 事实名称： 电子商务崛起加剧包装废弃物问题，推动重用创新
  网页链接： https://www.fortunebusinessinsights.com/zh/returnable-transport-packaging-market-104917
  事实介绍： 电子商务的迅猛发展导致一次性运输包装（如纸箱、塑料填充物）的使用量激增，加剧了资源消耗和废弃物管理压力。为此，越来越多的电商和物流公司开始投资和试点可重用运输包装（RTP）系统。例如，一些公司推出了可折叠、可追踪的重用包装箱，消费者在收到商品后可方便地将其返还。市场研究报告预测，在电子商务需求的推动下，可重用运输包装市场在 2025 年后将继续保持增长，预计年复合增长率 6.08%，这体现了为应对新增环境压力而产生的迫切创新需求。

二．重用模式的环境、经济与社会效益

章节概述：

重用模式能够同时创造环境、经济与社会三重价值，形成良性循环。在环境层面，它能规模化地减少废弃物、温室气体排放和水资源消耗。在经济层面，它不仅催生了千亿美元级别的巨大市场，还能为采纳企业带来高达 40%的直接成本节约，并吸引战略性投资。在社会层面，通过循环实践，企业能加强与社区等利益相关者的合作与信任。这种经济、环境和社会的协同效益，证明了重用是一种能够实现综合价值最大化的卓越商业战略。

事实列举：

宏观事实：

- 事实名称： 艾伦·麦克阿瑟基金会报告：规模化重用模式可显著减少温室气体排放与水资源消耗
  网页链接：
  https://content.ellenmacarthurfoundation.org/m/519c4d9a808b843f/original/Insights-summary-Unlocking-a-Reuse-Revolution-Scaling-Returnable-Packaging.pdf
  事实介绍： 这份由艾伦·麦克阿瑟基金会发布的深度报告《解锁重用革命》指出，大规模采用可回收包装的重用模式不仅能解决塑料污染问题，还能在减少温室气体（GHG）排放和水资源消耗方面发挥关键作用。报告通过情景建模展示了重用系统相较于一次性系统的环境优势，为企业和政府决策者提供了有力的环保依据。（高代表性：艾伦·麦克阿瑟基金会（EMF）是全球循环经济领域最权威的机构，其报告不仅定义了行业标准，还提供了广泛适用的情景建模数据。）

- 事实名称： 市场报告预测：全球可重用包装市场规模将在 2030 年达到 1901 亿 美元
  网页链接： https://www.grandviewresearch.com/industry-analysis/reusable-packaging-market-report
  事实介绍： 市场研究机构 Grand View Research 发布的行业报告预测，全球可重用包装市场规模将持续增长，从 2024 年的 1358 亿美元增长至 2030 年的 1901 亿美元，年均复合增长率为 5.9%。这一强劲的市场增长预期反映了企业投资和消费者接受度的不断提高，证明了重用模式背后巨大的商业价值和经济驱动力。（高代表性：标准的市场研究数据，提供了量化的市场规模和增长预期。对于论证重用模式的“商业可行性”和“资本潜力”有参考价值。）

- 事实名称： 投资趋势显示：企业正通过采用循环经济模式推动可持续发展目标
  网页链接： https://www.cdf1.com/midyear-review-the-state-of-sustainable-packaging-and-whats-gaining-momentum-in-2025/
  事实介绍： CDF Corporation 在 2025 年的可持续包装趋势观察中指出，许多全球性企业，如安姆科、雀巢和联合利华，都已设定了到 2025 年使其所有包装可回收或可重用的公共目标。企业对环境、社会和治理（ESG）的承诺以及日益严格的法规正在共同推动对循环包装系统的大规模投资，这表明重用模式正在成为企业长期战略和投资的核心部分。（高代表性：涉及雀巢、联合利华等全球顶级快消巨头（FMCG）的动向。这些企业的战略转变代表了整个产业链的风向标，属于行业级的高代表性趋势描述，即使是回调目标。）【注意：对外需谨慎使用】

具体事实：

- 事实名称： Plus Pack 案例显示“包装即服务”的重用模式可减少高达 60%的二氧化碳排放
  网页链接： https://stateofgreen.com/en/news/10-examples-of-circular-economy-solutions/
  事实介绍： 欧洲食品行业循环包装解决方案的领导者 Plus Pack 与初创公司 Circqle 合作，共同开发了一种针对食品包装的循环重用模式。该模式被称为“包装即服务”，通过建立独特的系统和数字化解决方案，对包装进行闭环管理和追踪。这种创新的循环消费模式旨在减少包装和浪费，与一次性包装相比，具有减少高达 60%二氧化碳排放的潜力。（高代表性：“Plus Pack”是欧洲知名的包装巨头，且其展示的“包装即服务（PaaS）”商业模式代表了 B2B 包装领域数字化转型的核心方向，具有行业示范意义。）

- 事实名称： 丹麦循环经济案例：旧砖再利用节能超过 95%，并显著减少二氧化碳排放
  网页链接： https://stateofgreen.com/en/news/10-examples-of-circular-economy-solutions/
  事实介绍： 丹麦绿色国度（State of Green）网站展示了多个循环经济的成功案例。其中，“Gamle Mursten”公司通过其专利技术清洁旧砖并使其重获新生。这种重用模式与生产新砖相比，能够节省超过 95%的能源。此外，每处理两千块旧砖，就能减少一吨的二氧化碳排放。这一案例生动地展示了在建筑行业中，重用模式如何同时实现巨大的环境和经济效益。（低代表性：案例处于建筑材料行业（砖块），非“塑料污染治理”。属于跨行业的循环经济类比案例。）

- 事实名称： 墨尔本会展中心通过重用杯项目大幅减少一次性废物
  网页链接： https://www.mcec.com.au/media/events-deliver-impact
  事实介绍： 在 2023-2024 财年，墨尔本会展中心（MCEC）通过其创新的可回收咖啡杯项

目，向超过 894,000 名参会代表提供了可重用的不锈钢杯。这一举措成功阻止了成千上万个一次性杯子最终被送往垃圾填埋场，展示了大型活动和场馆在推动重用模式、减少环境足迹方面的潜力。（高代表性：封闭/半封闭场景（如会展中心、体育馆）是重用模式目前最成熟、最容易落地的场景之一。MCEC 作为大型场馆的成功实践，对于同类场景具有极高的参考价值和可复制性。

- 事实名称： Grounds & Greens 企业案例证明：转向重用容器可节省 40%的外卖包装成本
  网页链接： https://www.sustain.ubc.ca/sites/default/files/2024-039_Case_Studies_Reusable_Food_Service_Ware_Wiehr.pdf
  事实介绍： 加拿大不列颠哥伦比亚大学（UBC）在 2024 年发布的一份关于重用食品服务器具的案例研究报告中，以一家名为“Grounds & Greens”的企业为例，证明了重用模式的直接经济效益。该企业通过完全过渡到使用可重用外卖容器，成功将其在该项上的支出降低了 40%。这个案例为餐饮及相关行业提供了清晰的成本节约路径。（低代表性：单体小企业（一家咖啡店/餐厅）的案例。）

- 事实名称： 澳大利亚水务公司的循环经济路线图：视重用为提升运营效率和利益相关者参与度的关键（弱关联，仅启发）
  网页链接： https://thinkplacex.com.au/case-study/a-roadmap-to-circularity-for-wannon-water/
  事实介绍： 澳大利亚维多利亚州西南部的 Wannon Water 水务公司制定了其 2023-2025 年循环经济路线图，旨在成为区域循环经济的领导者。该公司将循环原则（包括重用）整合到其核心组织战略中，通过重新利用废水中的生物固体等举措，不仅改善了废物管理，还加强了与利益相关者的合作与参与。这表明在公用事业领域，重用模式同样是提升运营效率和履行社会责任的有效途径。（低代表性：案例聚焦于公用事业（水务/生物固体），与核心的包装/塑料重用主题偏差较大，仅作为跨界启示。）

- 事实名称： 学术研究证实重用杯的环境效益优于一次性杯
  网页链接： https://www.eeer.org/journal/view.php?number=1655
  事实介绍： 发表在《环境工程研究》期刊上的一项 2024 年生命周期评估（LCA）研究，对一次性塑料杯和可重用杯对环境的影响进行了比较。研究发现，尽管可重用杯在制造和清洗过程中会产生一定的环境负荷，但只要达到一定的重用次数，其在温室气体排放等多个关键环境影响类别上的表现均显著优于一次性杯。这为推广重用系统替代一次性产品提供了有力的科学依据。

  该研究对 2022 年韩国一次性塑料杯（SUP cups）的消耗量进行了定量分析，并通过生命周期评估（LCA）的方法，比较了一次性塑料杯、可重复使用塑料杯和随行杯（tumblers）对全球变暖的影响（即碳足迹）。

  主要结论包括：

1. **消耗量：** 2022 年，韩国在咖啡店和快餐店消耗了约 58 亿个一次性塑料杯，相当于每人每年消耗 113 个。
2. **基准碳足迹：** 在基准情景下（每人年均使用 113 个一次性杯，S1），相关的总碳足迹估计约为 419,723 吨二氧化碳当量。
3. **减排情景分析：**
    - 实施押金退还制度（DRS）（S2），提高材料回收和能源回收率，每年可减少约 47,038 吨二氧化碳当量的温室气体排放。
    - 用可重复使用塑料杯（S3）或随行杯（S4）替代 25% 的一次性杯，估计分别可年均减少 12,406 吨和 77,050 吨的碳排放.
    - 若将 50% 的一次性杯替换为可重复使用的杯子（S5），每年可节省超过 80,000 吨的二氧化碳当量。

三，政策、资本与企业承诺的合力

章节概述：

重用模式的发展势头已不可逆转，这源于政策、资本与企业承诺三大核心驱动力的合力。在政策端，以欧盟为代表的监管机构正从鼓励转向立法强制，为市场提供了前所未有的确定性。在资本端，风险投资和企业战略投资正大规模涌入，支持重用生态的基础设施建设。在企业端，全球领先品牌纷纷设定公开的重用目标，并通过系统性合作将重用融入核心业务。这三股力量相互强化，形成了一个强大的正反馈循环，正推动重用经济呈指数级增长。

事实列举：

- 事实名称： 欧盟通过《包装和包装废弃物法规》（PPWR）草案，设定强制性重用目标
  网页链接：
  https://www.reloopplatform.org/ppwr/?gad_source=1&gad_campaignid=21512837651&gbraid=0AAAAA9-6uqoStJ02FmSkBqFg_-iSglTwB&gclid=CjwKCAjwr8LHBhBKEiwAy47uUofpEHni3EoQaar2mEBgHIjh6ASwCby3NwpZpeA8POrHfFY5VRYJ2RoC0M4QAvD_BwE
  事实介绍： 2024 年 3 月，欧盟理事会和欧洲议会就《包装和包装废弃物法规》（PPWR）的关键条款达成临时协议。这项具有里程碑意义的法规草案旨在从根本上改变欧盟的包装市场。其核心内容之一是为特定行业和包装类型设定了具有法律约束力的重用目标（Reuse Targets）。例如，到 2030 年，饮料（水、软饮料、酒精饮料等）外卖行业的经营者必须确保其 10%的包装是可重用的；到 2040 年，这一比例需要提升至 40%。该法规还对运输包装、电子商务包装等领域设定了具体的重用目标。这标志着欧盟的循环经济政策从依赖成员国自愿行动和市场引导，转向了以强有力的法律框架来强制推动重用模式的应用，是该领域从“鼓励”到“强制”转变的最重要体现之一。

- 事实名称： 法国《反浪费与循环经济法》进入具体实施阶段，强制餐饮业使用可重用容器

网页链接： https://www.fern.org/publications-insight/france-introduces-mandatory-re-use-in-restaurants-even-as-industry-undermines-eu-efforts-2665/
事实介绍： 自 2023 年 1 月 1 日起，法国依据其《反浪费与循环经济法》（AGEC Law）正式实施,禁止快餐店使用一次性餐具. 必须为堂食顾客提供可重用的餐具、杯子和盘子，由于大型快餐连锁店更容易过渡到可重复使用的餐具，因此每年设立 2000 万欧元的基金，以帮助独立餐厅转型。座位数少于 20 个的餐厅不在该立法范围内。面对这一强有力的新规，快餐行业已迅速采取合规行动。例如，连锁品牌 Fresh Burritos 引入了耐用的搪瓷餐具，汉堡王也已全面上线了新款可重用餐具系统，以适应新的监管环境。

- 项目名称： Vytal B 轮融资 (Series B)
  企业名称： Vytal (项目方) / Inven Capital (领投机构)，以及 NRW.Venture, Emerald Technology Ventures, Grazia Equity 等投资机构。
  投资金额： 1420 万欧元 (约 1540 万美元)
  项目介绍： 2025 年 3 月 11 日宣布，德国数字重用包装平台 Vytal 完成了 B 轮融资。Vytal 提供一个基于 App 的智能包装解决方案，允许消费者在合作餐厅（如 KFC、Backwerk 等）借用可重用碗和杯子。此轮融资将用于扩展其技术驱动的重用平台，推动餐饮外卖行业向无废弃模式转型。
  网页链接：
  https://tracxn.com/d/companies/vytal/__OLtCJjHMQbpbK7cfKwHJMmOJoc7xUbw0UEMQegserYs

- 项目名称： 超越购物袋试点项目 (Beyond the Bag Pilots)，由重塑零售袋联盟 (Consortium to Reinvent the Retail Bag) 发起。
  企业名称： 创始合作伙伴：CVS Health, 塔吉特 (Target) 和沃尔玛 (Walmart)。其他主要零售商合作伙伴包括：Kroger, Walgreens, DICK'S Sporting Goods, Ulta Beauty, Ahold Delhaize USA Brands (Stop & Shop, Giant 等) 和 Albertsons Companies (Safeway 等)。
  投资金额： "重塑零售袋联盟" 承诺投入超过 1500 万美元 (USD 15 million) 来发起 "超越购物袋倡议" (Beyond the Bag Initiative)。
  项目介绍： 这是一个由 Closed Loop Partners 的循环经济中心领导的多年期合作项目。该项目旨在寻找一次性塑料袋的替代方案。2021 年，该项目在北加州的部分 CVS Health、Target 和沃尔玛门店测试了多种可重复使用购物袋的服务模式，收集了关于消费者行为和运营模式的数据。
  网页链接： https://www.closedlooppartners.com/beyond-the-bag/reports/
- 项目名称： (投资) ecoSPIRITS
  企业名称： ecoSPIRITS。(注：全球酒业巨头保乐力加 (Pernod Ricard) 的风险投资部门 Convivialité Ventures 也参与了此轮融资。)
  投资金额： Closed Loop Partners 领投了 ecoSPIRITS 的 1000 万美元 (USD 10 million) A 轮融资。
  项目介绍： ecoSPIRITS 是一家为烈酒和葡萄酒行业提供闭环分销技术的公司。他们开发了 "ecoTOTE" 系统，这是一种可重复使用的玻璃容器，取代了传统的单次使用玻璃瓶。烈酒在

源头被装入 ecoTOTE，分销到酒吧和餐厅，使用后再由系统回收、清洁和重新灌装，从而大幅减少玻璃浪费和碳排放。
网页链接： https://ecospirits.global/wp-content/uploads/2023/09/Press-Release-ecoSPIRITS-Closes-USD-10-Million-Series-A-Fundraise-Led-by-Closed-Loop-Partners-100523.pdf

- 项目名称： 澳大利亚维多利亚州可持续发展局(Sustainability Victoria)，循环经济再利用试点基金 (Circular Economy Reuse Pilots Fund) 支持项目
  网页链接： https://www.sustainability.vic.gov.au/grants-funding-and-investment/funded-grants/circular-economy-reuse-pilots-fund-funded-projects
  项目介绍： 通过其“循环经济再利用试点基金”资助，从 2022 年起对多个重用项目进行了资助，其中包括迪肯大学、拉筹伯大学和莫纳什大学等在校园内引入和实施可重复使用餐具、杯子和集中清洗系统的项目。（具体投资列表详见附件）

- 项目名称： 扩大 Bettercup 可重用杯制造能力
  企业名称： Encoro Pty Ltd (Bettercup) / 维多利亚州政府基金 (CEBIC)
  投资金额： 446,851 澳元
  项目介绍： 2023 年 11 月 17 日宣布，作为维多利亚州“循环经济商业支持基金”的一部分，Bettercup 获得了这笔资金（Business support fund: round 3)。Bettercup 是一家为活动和场所提供可重用杯服务的公司。这笔投资将使其制造能力翻倍，旨在通过规模化生产降低可重用杯的成本，推动大型活动和场馆从一次性塑料杯向重用模式转变。
  网页链接： https://www.cebic.vic.gov.au/grants-funding-and-investment/funded-projects/circular-economy-business-support-fund-funded-projects

- 事实名称： 全球头部消费品牌设定具体重用目标
  网页链接：
  http://www.chinaeol.net/zyzx/sjhjzz/zzlm/tszs/202408/P020240801605169483431.pdf
  事实介绍： 为响应消费者对可持续性的要求和日益严格的法规，包括可口可乐、雀巢、联合利华在内的多家全球领先消费品公司都已公开承诺，将在 2025 年或 2030 年前，提高其产品中重用包装的比例。例如，可口可乐设定了到 2030 年实现至少 25%的饮料以可回收或可重用容器销售的目标。这些来自行业巨头的公开承诺，不仅向市场释放了明确的转型信号，也迫使整个供应链（包括包装供应商、零售商和回收系统）必须加快创新和投资，以支持重用模式的实现。

- 项目名称： 麦当劳德国公司采用 RECUP 循环杯系统
  企业名称： 麦当劳 (McDonald's) 与 reCup GmbH (RECUP)
  投资金额： 未披露 (此为大规模合作而非直接股权投资)
  项目介绍： 2023 年，为响应德国新的《包装法》（Mehrwegpflicht，即“强制重用义务”），麦当劳德国公司与德国最大的循环杯系统供应商 RECUP 合作。顾客支付押金即可获得可重用杯，并可在全国 20,000 多个合作点退还。此举是麦当劳实现其全球包装可持续发展目标

（到 2025 年实现 100%可再生、可回收或认证来源）的关键一步。
网页链接： https://www.sumkoka.com/how-to-replicate-mcdonalds-packaging-success.html

- 项目名称： CIRCLE 联盟 (CIRCLE Alliance)
  企业名称： 联合利华 (Unilever)、美国国际开发署 (USAID)、安永 (EY)
  投资金额： 2100 万美元 (联盟承诺金额)
  项目介绍： 2023 年 6 月宣布成立，CIRCLE 联盟是一个公私合作伙伴关系，旨在支持印度尼西亚、印度和越南等国的塑料价值链（包括重用和再填充模式）中的小企业和企业家。联合利华的注资来自其 10 亿欧元的“气候与自然基金”，长远目标是推动系统性变革，减少塑料使用，并支持循环经济中的弱势群体。
  网页链接： https://www.chemanalyst.com/NewsAndDeals/NewsDetails/unilever-unveils-fresh-initiative-to-enhance-packaging-circularity-29895

四，重用模式（潜在）优先发展场景

章节概述：

为确保重用模式成功落地，应优先从物流循环相对可控的 “微循环”开始。如体育场馆、大学校园等地理边界清晰的“闭环环境”，这能最大限度简化回收流程。其次是快餐、咖啡馆等高频次餐饮服务，可通过构建网络化押金系统实现。企业间（B2B）物流是重用模式应用最成熟的领域。最后，最具挑战但也至关重要的前沿是电子商务，其成功依赖于技术和模式创新。这种由内向外、由简到繁的扩张路径，能够最大化成功率。

Reuse Pattern: Core Strategy and Factual Basis for Plastic Pollution Governance

I. Why the Reuse Pattern Are the Solution to Plastic Pollution

Chapter Overview:

The current plastic economy remains trapped in a linear model of high production and high waste. While recycling is important, it is far from sufficient to reverse the worsening trends of plastic pollution and resource waste. In recent years, the global economic circularity rate has even declined—over 90% of virgin materials (including virgin plastics) are discarded after a single use, highlighting the limitations of traditional end-of-pipe governance approaches. Faced with this crisis, reuse pattern offer a necessary means to address the problem at its source. Authoritative institutions such as the United Nations Environment Programme (UNEP) and the World Economic Forum (WEF) have identified reuse as a key strategy to mitigate global plastic pollution. Scientific research has also confirmed that, from a full-life-cycle perspective, reuse systems outperform single-use pattern significantly in terms of environmental benefits, making them a fundamental solution to resource depletion and environmental pollution. The rapid expansion of emerging business pattern such as online retail, on-demand delivery, and food delivery is driving a surge in packaging waste, further making reuse pattern an urgent direction for business sustainability transformation.

Examples:

- Title: Declining Global Economic Circularity Rate Highlights Resource Utilization Crisis
- Link: https://www.circularity-gap.world/2023
- Description: According to the 2023 Circularity Gap Report released by the influential organization Circle Economy, the global economic circularity rate has dropped from 9.1% in 2018 to 7.2% in 2023. This means the global economy's dependence on virgin resources has increased rather than decreased—over 90% of materials are discarded after one use, intensifying pressures on resource depletion and environmental pollution. The report emphasizes that promoting circular economy strategies such as reuse is crucial to reversing this trend and achieving sustainable development.

- Title: World Economic Forum: Reuse pattern Are Key to Solving the Plastic Crisis
- Link: https://www3.weforum.org/docs/WEF_Scaling_Reuse_pattern_2023.pdf

- Description: The World Economic Forum's 2023 report Scaling Reuse pattern: A Guide to Standardized Measurement states that reuse is one of the most powerful market transformations to address the growing plastic pollution crisis. The report highlights that half of all plastics produced globally are used for single-use applications, with extremely low recycling rates. Converting 20% of global single-use plastic packaging to reuse pattern is expected to create $10 billion in business opportunities while significantly reducing plastic waste in the environment.

- Title: UNEP Report: Turning Off the Tap: How the World Can End Plastic Pollution and Create a Circular Economy
- Link:https://www.unep.org/resources/turning-off-tap-end-plastic-pollution-create-circular-economy
- Description: This 2023 report by the United Nations Environment Programme (UNEP) argues that ending plastic pollution requires a transition from a linear to a circular economy, with three core market transformations: Reuse, Recycle, and Reorient and Diversify. The report explicitly predicts that promoting reusable packaging (e.g., refillable bottles, bulk dispensers, deposit return systems) could reduce plastic pollution by 30% by 2040. In comparison, recycling is expected to contribute 20% reduction, and alternative materials (reorientation) 17%. Since the production and conversion of virgin plastics account for over 80% of the industry's greenhouse gas emissions, directly reducing demand for virgin plastics through "reuse" is the most environmentally beneficial measure with the greatest potential for greenhouse gas reduction among all pathways.

- Title: Rise of E-Commerce Exacerbates Packaging Waste, Driving Reuse Innovation
- Link:https://www.fortunebusinessinsights.com/zh/returnable-transport-packaging-market-104917
- Description: The rapid development of e-commerce has led to a surge in the use of single-use transport packaging (e.g., cartons, plastic fillers), increasing pressures on resource consumption and waste management. In response, a growing number of e-commerce platforms and logistics companies are investing in and piloting Reusable Transport Packaging (RTP) systems. For example, some companies have launched foldable, trackable reusable shipping boxes that consumers can easily return after receiving their goods. Market research reports predict that driven by e-commerce demand, the reusable transport packaging market will continue to grow after 2025, with a projected compound annual growth rate (CAGR) of 6.08%, reflecting the urgent need for innovation to address emerging environmental pressures.

II. Environmental, Economic, and Social Benefits of Reuse pattern

Chapter Overview:

Reuse pattern create triple value—environmental, economic, and social—forming a virtuous

cycle. Environmentally, they can reduce waste, greenhouse gas emissions, and water consumption at scale. Economically, they not only spawn a trillion-dollar market but also deliver up to 40% direct cost savings for adopting enterprises and attract strategic investments. Socially, circular practices enable enterprises to strengthen cooperation and trust with stakeholders such as communities. This synergy of economic, environmental, and social benefits proves that reuse is an excellent business strategy for maximizing comprehensive value.

Examples:

Macroscopic facts:

- Title: Ellen MacArthur Foundation Report: Scaled Reuse pattern Significantly Reduce Greenhouse Gas Emissions and Water Consumption
- Link:https://content.ellenmacarthurfoundation.org/m/519c4d9a808b843f/original/Insights-summary-Unlocking-a-Reuse-Revolution-Scaling-Returnable-Packaging.pdf
- Description: This in-depth report, titled "Unlocking the Reuse Revolution", released by the Ellen MacArthur Foundation, states that the widespread adoption of a reuse model using recyclable packaging not only addresses the issue of plastic pollution but also plays a crucial role in reducing greenhouse gas (GHG) emissions and water consumption. The report showcases the environmental advantages of the reuse system through scenario modeling, providing a strong environmental basis for decision-makers in enterprises and governments. (High representativeness: The Ellen MacArthur Foundation (EMF) is the most authoritative institution in the field of global circular economy. Its reports not only define industry standards but also provide widely applicable scenario modeling data.)

- Title: Market Report Prediction: Global Reusable Packaging Market to Reach $190.1 Billion by 2030
- Link:https://www.grandviewresearch.com/industry-analysis/reusable-packaging-market-report
- Description: An industry report by market research firm Grand View Research predicts that the global reusable packaging market will continue to grow, expanding from $135.8 billion in 2024 to $190.1 billion by 2030, at a CAGR of 5.9%. This strong growth forecast reflects increasing corporate investment and consumer acceptance, demonstrating the enormous commercial value and economic driving force behind reuse pattern. (High representativeness: Standard market research data providing quantitative market size and growth projections, valuable for demonstrating the "commercial feasibility" and "capital potential" of reuse pattern.)

- Title: Investment Trends: Enterprises Driving Sustainable Development Goals Through Circular Economy pattern
- Link:https://www.cdf1.com/midyear-review-the-state-of-sustainable-packaging-and-whats-gaining-momentum-in-2025/
- Description: CDF Corporation’s 2025 Sustainable Packaging Trends Observation notes that many global enterprises, such as Amcor, Nestlé, and Unilever, have set public targets to make

all their packaging recyclable or reusable by 2025. Enterprises' commitments to Environmental, Social, and Governance (ESG) and increasingly stringent regulations are jointly driving large-scale investment in circular packaging systems, indicating that reuse pattern are becoming a core part of corporate long-term strategies and investments. (High representativeness: Covers the actions of global top fast-moving consumer goods (FMCG) giants. The strategic shifts of these enterprises represent the direction of the entire industrial chain, serving as high-representative industry-wide trend descriptions, even for adjusted targets.) [Note: Exercise caution when using externally]

Specific Facts:

- Title: Plus Pack Case: "Packaging as a Service" Reuse Model Reduces CO_2 Emissions by Up to 60%
- Link:https://stateofgreen.com/en/news/10-examples-of-circular-economy-solutions
- Description: Plus Pack, a European leader in circular packaging solutions for the food industry, has partnered with startup Circqle to develop a circular reuse model for food packaging. Known as "Packaging as a Service (PaaS)," this model establishes a unique system with digital solutions for closed-loop management and tracking of packaging. This innovative circular consumption model aims to reduce packaging and waste, with the potential to cut carbon dioxide emissions by up to 60% compared to single-use packaging. (High representativeness: "Plus Pack" is a well-known European packaging giant, and its "Packaging as a Service (PaaS)" business model represents the core direction of digital transformation in the B2B packaging sector, with industry demonstration significance.)

- Title: Danish Circular Economy Case: Reusing Old Bricks Saves Over 95% Energy and Significantly Reduces CO_2 Emissions
- Link:https://stateofgreen.com/en/news/10-examples-of-circular-economy-solutions/
- Description: Denmark's State of Green website showcases several successful circular economy cases. Among them, "Gamle Mursten" uses patented technology to clean and revitalize old bricks. Compared to producing new bricks, this reuse model saves over 95% of energy. Additionally, processing 2,000 old bricks reduces carbon dioxide emissions by one ton. This case vividly demonstrates how reuse pattern in the construction industry can achieve substantial environmental and economic benefits simultaneously. (Low representativeness: The case belongs to the construction materials industry (bricks), not "plastic pollution governance." It is an analogous cross-industry circular economy case.)

- Title: Melbourne Convention and Exhibition Centre (MCEC) Significantly Reduces Single-Use Waste Through Reusable Cup Program
- Link: https://www.mcec.com.au/media/events-deliver-impact
- Description: In the 2023-2024 fiscal year, MCEC provided over 894,000 conference attendees with reusable stainless steel cups through its innovative recyclable coffee cup program. This initiative successfully diverted tens of thousands of single-use cups from landfills, demonstrating the potential of large-scale events and venues to promote reuse pattern and reduce environmental footprints. (High representativeness: Closed/semi-closed

scenarios (e.g., convention centers, stadiums) are among the most mature and easily implementable settings for reuse pattern. MCEC's successful practice as a large venue has high reference value and replicability for similar scenarios.)

- Title: Grounds & Greens Enterprise Case: Switching to Reusable Containers Saves 40% on Food Delivery Packaging Costs
- Link:https://www.sustain.ubc.ca/sites/default/files/2024-039_Case_Studies_Reusable_Food_Service_Ware_Wiehr.pdf
- Description: A 2024 case study on reusable food service ware published by the University of British Columbia (UBC) cites "Grounds & Greens" as evidence of the direct economic benefits of reuse pattern. By fully transitioning to reusable food delivery containers, the enterprise reduced its spending on this item by 40%. This case provides a clear cost-saving pathway for the catering and related industries. (Low representativeness: Case of a single small enterprise (a coffee shop/restaurant).)

- Title: Australian Water Utility's Circular Economy Roadmap: Reuse as Key to Improving Operational Efficiency and Stakeholder Engagement (Weakly Relevant, Inspirational Only)
- Link:https://thinkplacex.com.au/case-study/a-roadmap-to-circularity-for-wannon-water/
- Description: Wannon Water, a water utility in southwest Victoria, Australia, has developed its 2023-2025 Circular Economy Roadmap, aiming to become a regional leader in the circular economy. The company has integrated circular principles (including reuse) into its core organizational strategy, and initiatives such as repurposing biosolids from wastewater have not only improved waste management but also enhanced stakeholder cooperation and engagement. This indicates that in the public utility sector, reuse pattern are also effective in improving operational efficiency and fulfilling social responsibilities. (Low representativeness: The case focuses on public utilities (water/biosolids), deviating significantly from the core theme of packaging/plastic reuse, serving only as cross-sectoral inspiration.)

- Title: Academic Research Confirms Environmental Benefits of Reusable Cups Outperform Single-Use Cups
- Link: https://www.eeer.org/journal/view.php?number=1655
- Description: A 2024 life cycle assessment (LCA) study published in the Environmental Engineering Research journal compared the environmental impacts of single-use plastic cups and reusable cups. The research found that while reusable cups incur certain environmental burdens during manufacturing and cleaning, once they reach a specific number of reuses, their performance in key environmental impact categories such as greenhouse gas emissions is significantly superior to single-use cups. This provides strong scientific evidence for promoting reuse systems as alternatives to single-use products.

The study conducted a quantitative analysis of single-use plastic (SUP) cup consumption in South Korea in 2022 and compared the global warming potential (i.e., carbon footprint) of single-use plastic cups, reusable plastic cups, and tumblers using LCA methodology.

Key findings include:

1. **Consumption**: In 2022, approximately 5.8 billion single-use plastic cups were consumed in South Korean coffee shops and fast-food restaurants, equivalent to 113 cups per person per year.
2. **Baseline Carbon Footprint:** Under the baseline scenario (113 single-use cups per person per year, S1), the total associated carbon footprint is estimated at approximately 419,723 tons of CO_2 equivalent.
3. **Emission Reduction Scenario Analysis**:

- Implementing a Deposit Return System (DRS) (S2) to improve material recycling and energy recovery rates could reduce greenhouse gas emissions by approximately 47,038 tons of CO_2 equivalent annually.
- Replacing 25% of single-use cups with reusable plastic cups (S3) or tumblers (S4) could reduce carbon emissions by an estimated 12,406 tons and 77,050 tons per year, respectively.
- Replacing 50% of single-use cups with reusable cups (S5) could save over 80,000 tons of CO_2 equivalent annually.

III. Synergy of Policy, Capital, and Corporate Commitments

Chapter Overview:

The momentum of reuse pattern is irreversible, driven by the synergy of three core forces: policy, capital, and corporate commitments. On the policy front, regulators represented by the European Union are shifting from encouragement to mandatory legislation, providing unprecedented certainty for the market. On the capital front, venture capital and corporate strategic investments are flooding in to support the construction of reuse ecosystem infrastructure. On the corporate front, leading global brands have set public reuse targets and integrated reuse into core business operations through systematic cooperation. These three forces reinforce each other, forming a powerful positive feedback loop that is driving exponential growth in the reuse economy.

Examples:

- Title: EU Reaches Provisional Agreement on the Packaging and Packaging Waste Regulation (PPWR) Draft, Setting Mandatory Reuse Targets
- Link:https://www.reloopplatform.org/ppwr/?gad_source=1&gad_campaignid=21512837651&gbraid=0AAAAA9-6uqoStJ02FmSkBqFg_-iSglTwB&gclid=CjwKCAjwr8LHBhBKEiwAy47uUofpEHni3EoQaar2mEBgHIjh6ASwCby3NwpZpeA8POrHfFY5VRYJ2RoC0M4QAvD_BwE
- Description: In March 2024, the Council of the European Union and the European Parliament reached a provisional agreement on key provisions of the Packaging and Packaging Waste Regulation (PPWR). This landmark regulation aims to fundamentally transform the EU's packaging market. A core component is the establishment of legally binding reuse targets for

specific industries and packaging types. For example, by 2030, operators in the beverage (water, soft drinks, alcoholic beverages, etc.) takeaway industry must ensure that 10% of their packaging is reusable; by 2040, this proportion must increase to 40%. The regulation also sets specific reuse targets for transport packaging, e-commerce packaging, and other areas. This marks a shift in the EU's circular economy policy from relying on voluntary actions by member states and market incentives to a robust legal framework mandating the adoption of reuse pattern, representing one of the most significant transitions from "encouragement" to "mandate" in this field.

- Title: France's Anti-Waste for a Circular Economy Act (AGEC Law) Enters Implementation Phase, Mandating Reusable Containers in Catering
- Link:https://www.fern.org/publications-insight/france-introduces-mandatory-re-use-in-restaurants-even-as-industry-undermines-eu-efforts-2665/
- Description: Effective January 1, 2023, France officially implemented the Anti-Waste for a Circular Economy Act (AGEC Law), prohibiting fast-food restaurants from using single-use tableware. They must provide reusable cutlery, cups, and plates for on-site diners. Recognizing that large fast-food chains can transition more easily to reusable tableware, a €20 million annual fund has been established to assist independent restaurants in making the switch. Restaurants with fewer than 20 seats are exempt from the legislation. In response to this stringent new regulation, the fast-food industry has taken swift compliance actions. For example, chain brand Fresh Burritos introduced durable eTitlel tableware, and Burger King has fully launched a new reusable tableware system to adapt to the new regulatory environment.

- Project Title: Vytal Series B Financing

Companies: Vytal (Project Owner) / Inven Capital (Lead Investor), along with NRW.Venture, Emerald Technology Ventures, Grazia Equity, and other investment institutions.

Investment Amount: €14.2 million (approximately $15.4 million)

Project Description: Announced on March 11, 2025, German digital reusable packaging platform Vytal completed its Series B financing. Vytal offers an app-based smart packaging solution that allows consumers to borrow reusable bowls and cups from partner restaurants (e.g., KFC, Backwerk). The funding will be used to expand its technology-driven reuse platform and drive the transition of the food delivery industry toward a zero-waste model.

Link:https://tracxn.com/d/companies/vytal/__OLtCJjHMQbpbK7cfKwHJMmOJoc7xUbw0UEMQegserYs

- Project Title: Beyond the Bag Pilots, Launched by the Consortium to Reinvent the Retail Bag

Companies: Founding Partners: CVS Health, Target, and Walmart. Other major retailer partners include: Kroger, Walgreens, DICK'S Sporting Goods, Ulta Beauty, Ahold Delhaize USA Brands (Stop & Shop, Giant, etc.), and Albertsons Companies (Safeway, etc.).

Investment Amount: The Consortium to Reinvent the Retail Bag has committed over $15 million to launch the Beyond the Bag Initiative.

Project Description: A multi-year collaborative project led by the Circular Economy Center at Closed Loop Partners. The initiative aims to find alternatives to single-use plastic shopping bags.

In 2021, the project tested various reusable shopping bag service pattern in select CVS Health, Target, and Walmart stores in Northern California, collecting data on consumer behavior and operational pattern.

Link: https://www.closedlooppartners.com/beyond-the-bag/reports/

- Project Title: (Investment) ecoSPIRITS

Companies: ecoSPIRITS. (Note: Convivialité Ventures, the venture capital arm of global spirits giant Pernod Ricard, also participated in this round of financing.)

Investment Amount: Closed Loop Partners led a $10 million Series A financing round for ecoSPIRITS.

Project Description: ecoSPIRITS is a company providing closed-loop distribution technology for the spirits and wine industry. They developed the "ecoTOTE" system, a reusable glass container that replaces traditional single-use glass bottles. Spirits are filled into ecoTOTEs at the source, distributed to bars and restaurants, and after use, the system recycles, cleans, and refills them, thereby significantly reducing glass waste and carbon emissions.

Link:https://ecospirits.global/wp-content/uploads/2023/09/Press-Release-ecoSPIRITS-Closes-USD-10-Million-Series-A-Fundraise-Led-by-Closed-Loop-Partners-100523.pdf

- Project Title: Sustainability Victoria (Australia) Circular Economy Reuse Pilots Fund-Supported Projects

Link:https://www.sustainability.vic.gov.au/grants-funding-and-investment/funded-grants/circular-economy-reuse-pilots-fund-funded-projects

Project Description: Through its Circular Economy Reuse Pilots Fund, Sustainability Victoria has funded multiple reuse projects since 2022, including initiatives by Deakin University, La Trobe University, and Monash University to introduce and implement reusable tableware, cups, and centralized cleaning systems on campus. (See attachment for detailed investment list.)

- Project Title: Expanding Bettercup’s Reusable Cup Manufacturing Capacity

Companies: Encoro Pty Ltd (Bettercup) / Victorian Government Fund (CEBIC)

Investment Amount: AUD 446,851

Project Description: Announced on November 17, 2023, as part of Victoria’s Circular Economy Business Support Fund (Round 3), Bettercup received this funding. Bettercup is a company providing reusable cup services for events and venues. The investment will double its manufacturing capacity, aiming to reduce the cost of reusable cups through large-scale production and drive the transition from single-use plastic cups to reuse pattern in large events and venues.

Link:https://www.cebic.vic.gov.au/grants-funding-and-investment/funded-projects/circular-economy-business-support-fund-funded-projects

- Title: Leading Global Consumer Brands Set Specific Reuse Targets

Link:http://www.chinaeol.net/zyzx/sjhjzz/zzlm/tszs/202408/P020240801605169483431.pdf

Description: In response to consumer demands for sustainability and increasingly stringent regulations, several leading global consumer goods companies, including Coca-Cola, Nestlé, and Unilever, have publicly committed to increasing the proportion of reusable packaging in their products by 2025 or 2030. For example, Coca-Cola has set a target to sell at least 25% of its

beverages in recyclable or reusable containers by 2030. These public commitments from industry giants not only send clear transformation signals to the market but also force the entire supply chain (including packaging suppliers, retailers, and recycling systems) to accelerate innovation and investment to support the realization of reuse pattern.

- Project Title: McDonald’s Germany Adopts the RECUP Circular Cup System

Companies Involved: McDonald’s and reCup GmbH (RECUP)
Investment Amount: Not disclosed (this is a large-scale cooperation rather than direct equity investment)

Project Description: In 2023, in response to Germany’s new Packaging Act (Mehrwegpflicht, or "Mandatory Reuse Obligation"), McDonald’s Germany partnered with RECUP, Germany’s largest circular cup system provider. Customers pay a deposit to receive a reusable cup, which can be returned at over 20,000 partner locations nationwide. This initiative is a key step in McDonald’s efforts to achieve its global packaging sustainability target (100% renewable, recyclable, or certified-sourced by 2025).

Link:https://www.sumkoka.com/how-to-replicate-mcdonalds-packaging-success.html

- Project Title: CIRCLE Alliance

Companies: Unilever, United States Agency for International Development (USAID), Ernst & Young (EY)

Investment Amount: $21 million (alliance committed amount)

Project Description: Launched in June 2023, the CIRCLE Alliance is a public-private partnership aiming to support small businesses and entrepreneurs in the plastic value chain (including reuse and refill pattern) in countries such as Indonesia, India, and Vietnam. Unilever’s investment comes from its €1 billion Climate and Nature Fund, with the long-term goal of driving systemic change, reducing plastic use, and supporting vulnerable groups in the circular economy.

Link:https://www.chemanalyst.com/NewsAndDeals/NewsDetails/unilever-unveils-fresh-initiative-to-enhance-packaging-circularity-29895

IV. (Potential) Priority Development Scenarios for Reuse pattern

Chapter Overview:

To ensure the successful implementation of reuse pattern, priority should be given to starting with "microcircuits" where logistics cycles are relatively controllable. For example, "closed-loop environments" with clear geographical boundaries such as stadiums and university campuses can minimize the complexity of recycling processes. Next are high-frequency catering services such as fast food and coffee shops, where networked deposit systems can be established. Business-to-Business (B2B) logistics is the most mature field for reuse model application. Finally, the most challenging yet crucial frontier is e-commerce, whose success depends on technological and model innovation. This expansion path—from internal to external, from simple to complex—can maximize the success rate.

(Note: Projects appearing in "Attachment 1" of the report are not repeated here.)