2022 年 7 月发布
2025 年 4 月第一次修订
2026 年 6 月第二次修订
版本：A2

棕榈油衍生脂肪酸供应链森林砍伐与转化风险评估报告

本报告旨在对公司采购的棕榈油衍生脂肪酸产品供应链中潜在的森林砍伐与土地转化风险进行全面评估。随着全球对可持续棕榈油需求的增长以及欧盟等地区日益严格的法规要求，供应链透明度与可持续性已成为企业风险管理的关键环节。报告将分析棕榈油产业的环境与社会影响、评估当前供应链风险、并提出一套全面的风险管理策略与改进建议，以帮助公司建立更具韧性的可持续供应链体系。

执行摘要

本风险评估报告对公司采购的棕榈油衍生脂肪酸产品供应链中的森林砍伐和土地转化风险进行了系统分析。棕榈油作为全球产量最大的植物油，其生产过程中的毁林问题已成为国际关注焦点，特别是在主要生产国印度尼西亚和马来西亚，油棕种植园的扩张已导致大量原始森林消失。核心发现表明，棕榈油供应链中的主要风险集中在以下几个方面：

- 原料来源不透明：约 41%的马来西亚和 26%的印度尼西亚油棕种植由小农户经营，这些小型种植园往往缺乏完善的追溯系统
- 法规合规风险：欧盟《零毁森林法案》(EUDR)将于 2024 年 12 月强制实施，要求进入欧盟市场的棕榈油产品必须证明不涉及 2020 年 12 月 31 日后的森林砍伐
- 市场与声誉风险：多家国际品牌因供应链与毁林关联而面临消费者抵制和 NGO 批评
- 价格波动风险：气候因素和政策变化导致棕榈油价格预计在 2025 年达到每吨 4600 林吉特的历史高位

通过对行业领先实践的分析，本报告建议公司采取以下关键措施：

1. 建立完善的供应链追溯系统，实现从脂肪酸产品到油棕种植园的可追溯性
2. 优先采购 RSPO 认证的可持续棕榈油衍生物，逐步提高实体供应链(MB/SG)比例
3. 开展供应商能力建设计划，特别是针对小农户的可持续种植培训
4. 制定公开的可持续棕榈油采购政策，并定期披露进展
5. 参与行业倡议和多利益相关方合作，推动系统性变革

实施这些建议将帮助公司有效降低供应链中的环境与社会风险，确保业务连续性，同时提升品牌声誉和满足日益严格的法规要求。

引言与背景

棕榈油及其衍生物作为全球应用最广泛的植物油，已成为现代工业不可或缺的原材料。从食品、化妆品到清洁剂和生物燃料，棕榈油衍生的脂肪酸产品因其独特的物理化学性质和经济性而被广泛应用。全球棕榈油产量从 2018 年的 7417 万吨增长至 2022 年的 7758 万吨，其中印度尼西亚和马来西亚贡献了约 84%的产量，两国油棕种植面积合计达 1900 万公顷。然而，这一庞大产业背后隐藏着严峻的环境与社会挑战。

森林砍伐与土地转化已成为棕榈油产业最受争议的问题。根据联合国开发计划署的数据，原生林转化为油棕种植园会导致原有的物种丰富度降低 83%。世界银行统计显示，1990-2020 年间，印度尼西亚超过 2640 万公顷的原始森林消失，同期该国油棕种植园面积从 110 万公顷激增至 1638 万公顷。这种大规模的森林转化不仅导致生物多样性丧失，还释放了大量储

存的碳，加剧气候变化。据估计，森林砍伐和退化贡献了全球约 10%的温室气体排放。

国际社会与监管机构对此问题的关注度持续升高。2018 年欧盟修订《可再生能源指令》(REDII)，计划到 2030 年逐步淘汰基于棕榈油的生物燃料。2023 年 6 月，欧盟《零毁森林法案》(EUDR)正式生效，将于 2024 年 12 月 30 日强制实施，禁止在欧盟市场销售涉及森林砍伐的七种大宗商品，包括棕榈油。该法案要求企业进行尽职调查，证明其产品不涉及 2020 年 12 月 31 日后的森林砍伐，否则将面临罚款、没收产品等处罚。

供应链复杂性使得棕榈油衍生脂肪酸产品的可持续采购面临巨大挑战。棕榈油供应链通常涉及多个中间环节：从油棕种植园到压榨厂、精炼厂、衍生物生产商，最后到终端产品制造商。特别是在脂肪酸等衍生物领域，原料往往经过多次混合和加工，使得追溯原始种植来源变得极为困难。此外，印度尼西亚和马来西亚约 30-40%的油棕由小农户种植，这些小型生产者通常缺乏资源和技术能力实施可持续实践或参与认证计划。

企业风险意识正在快速提升。越来越多的消费品公司和化工企业认识到，供应链中的森林砍伐风险不仅关乎企业声誉，还可能影响市场准入和融资条件。环境调查局(EIA)2024 年的报告显示，多家跨国公司的棕榈油供应商与秘鲁亚马逊地区的非法森林砍伐有关联，引发广泛关注。与此同时，投资者和消费者对可持续产品的需求持续增长，推动企业加强供应链透明度和管理。

本报告的目的在于帮助公司系统识别、评估和管理棕榈油衍生脂肪酸供应链中的森林砍伐与转化风险，借鉴行业最佳实践，制定切实可行的改进方案，确保供应链的可持续性和合规性，同时满足利益相关方日益增长的期望。

棕榈油产业与森林砍伐现状分析

全球棕榈油产业格局呈现出高度集中的特点，无论是在生产、贸易还是消费环节。作为世界上产量最大的植物油，棕榈油 2022 年全球产量达到 7758 万吨，其中印度尼西亚贡献 4600 万吨(59.3%)，马来西亚 1860 万吨(24%)，两国合计占比超过 83%。从种植面积来看，2022 年全球油棕种植总面积 2651.9 万公顷，印度尼西亚独占 1350 万公顷(50.9%)，马来西亚 550 万公顷(20.7%)，尼日利亚 300 万公顷(11.3%)。这种地理集中度使得供应链风险评估可以聚焦于少数几个关键产区，但也增加了区域性风险对全球市场的冲击强度。

生产国的森林砍伐现状

印度尼西亚和马来西亚作为全球棕榈油生产双巨头，其油棕种植扩张与森林砍伐的关联性已被广泛记录。根据世界银行数据，1990-2020 年间，印度尼西亚损失了超过 2640 万公顷原始森林，而该国油棕种植园面积同期从 110 万公顷扩张至 1638 万公顷。联合国开发计划署的报告指出，原生林和伐木林转化为油棕种植园会导致**物种丰富度降低 83%**。在马来西亚，特别是沙巴和砂拉越地区，油棕种植园的扩张同样以牺牲热带雨林为代价，威胁到猩猩、侏儒象等濒危物种的栖息地。

秘鲁、哥伦比亚等新兴产区的森林砍伐问题也日益凸显。环境调查局(EIA)2024 年的报告揭露，秘鲁亚马逊地区的棕榈油和可可公司推动了大规模森林砍伐，涉及超过 13,000 公顷的非法清砍活动。更令人担忧的是，秘鲁国会近期通过了一项森林法修正案，宽恕历史上的非法砍伐行为，这可能导致更多森林被转化为农业用地。这类新兴产区的监管薄弱和治理缺失，为供应链风险评估带来了额外挑战。

棕榈油贸易流向与市场动态

全球棕榈油贸易格局呈现出明显的"南向北"和"东向西"特征。2022 年全球棕榈油出口量 4940 万吨，印度尼西亚占 57.1%(2820 万吨)，马来西亚占 32%(1580 万吨)。进口方面则相对分散，主要进口国包括印度(830 万吨)、中国(720 万吨)、欧盟(590 万吨)和巴基斯坦(360 万吨)。值得注意的是，中国作为世界第二大棕榈油进口国和第三大消费国，2018-2022 年进口量整体呈下降趋势，2022 年进口 494.35 万吨，为近五年最低值。

价格波动与市场不确定性正在加剧供应链风险。Malaysian Rating Corporation Bhd(MARC Ratings)预测，2025 年棕榈油价格可能达到每吨 4600 林吉特的历史高位。价格上涨的主要驱动因素包括印尼出口减少、马来西亚不利天气条件以及欧盟等市场的政策限制。这种价格波动不仅影响采购成本，还可能导致供应商为追求短期利润而忽视可持续实践，增加森林砍伐风险。

小农户在供应链中的角色与挑战

小农户种植模式在主要生产国占据重要地位。2022 年数据显示，印度尼西亚 41%的油棕种植面积和马来西亚 26%的种植面积由小农户经营。这些小农户通常缺乏资金、技术和管理能力来实施可持续种植实践，也难以承担认证成本。欧盟《零毁森林法案》的实施可能将这些小农户排除在全球供应链之外，严重影响他们的生计。印度尼西亚和马来西亚已多次向 WTO 表示抗议，认为该法案实际是制造进口壁垒，将发展中国家农产品拒之门外。

小农户融入可持续供应链面临多重障碍。首先，土地权属不清晰在许多产区是普遍问题，小农户往往无法提供合法的土地所有权证明。其次，生产记录和追溯系统不完善，使得他们的产品难以满足欧盟等市场的尽职调查要求。第三，市场信息不对称和中间商盘剥导致小农户获得的价格溢价有限，缺乏参与可持续认证的经济动力。这些结构性挑战需要全行业的协作才能有效解决。

表：主要棕榈油生产国种植面积结构(2022 年)

国家	总种植面积(万公顷)	小农户占比(%)	企业种植园占比(%)
印度尼西亚	1350	41	59
马来西亚	550	26	74
尼日利亚	300	/	/
全球总计	2651.9	约 30-35(估算)	约 65-70(估算)

供应链风险评估框架

建立系统化的风险评估框架是管理棕榈油衍生脂肪酸供应链中森林砍伐与转化风险的基础。本部分将详细阐述评估方法、风险分类体系以及具体评估指标，为公司提供一套可操作的供应链风险评估工具。这一框架综合了国际公认的标准、行业最佳实践以及棕榈油供应链的特殊性，确保评估结果既全面又具有针对性。

风险评估方法论

供应链映射与追溯是风险评估的首要步骤。对于棕榈油衍生脂肪酸产品，完整的供应链通常包括以下环节：油棕种植园→鲜果串收购站→棕榈果压榨厂→棕榈油精炼厂→脂肪酸生产厂→最终产品制造商。风险评估需要沿着这一链条逐级追溯，识别每个环节潜在的森林砍

伐与土地转化风险。实际操作中，可采用"从后向前"的追溯方法，首先要求直接供应商提供原料来源信息，然后逐步向上游推进，直至种植园层面。

本项目配置多套森林砍伐与土地转化风险评估工具，可根据企业供应链环节、原料产地、经营活动差异化选用适配方案，共包含四类标准化评估手段：

1. Desk research（案头研究）

   作为全链条风险初筛基础工具，批量整合公开第三方数据完成产区、供应商基础风险分级，数据来源包含：

   ●全球森林溯源平台：Global Forest Watch 、Trase、Starling 卫星公开林地损耗数据；

   ●官方法规档案：EUDR 尽职调查规范、印尼 / 马来西亚林业土地管理条例、集团 NDPE 采购政策、供应商合同约束条款、《纽约森林宣言》承诺文件；

   ●第三方公开调研资料：EIA、WWF 等 NGO 产区毁林调查报告、RSPO 行业年度报告、各国政府土地变更备案记录、CDP 公开环境披露数据；

   ●历史风险台账：媒体曝光非法砍伐事件、企业环境处罚公示、劳工投诉记录、SMETA 审计历史报告。 通过案头研究快速标记印尼苏门答腊、马来西亚沙巴等高风险区域，优先分配审核资源，支撑 2022 基线风险摸排、年度可持续报告编制工作。

2. Collection of assessment data of known direct and indirect suppliers（直 / 间接供应商评估档案收集）

   覆盖集团全部一级榨油厂、二级种植园供应商及所有第三方合作方，强制收集标准化风险佐证材料，核心文件包含 NDPE IRF 档案，建立集团统一供应商风险档案库：

   ●土地权属文件：地块产权证明、2020 年 12 月 31 日前 / 后开发时序凭证、地块原始植被类型、HCV/HCS 高价值林地划分记录；

   ●可持续认证资料：RSPO 全套供应链证书（IP/SG/MB/B&C 分类台账）、独立 HCV/HCS 评估报告、泥炭地管控与复湿试点方案；

   ●社会合规材料：原住民 FPIC 自由事先知情同意书、劳工权益审核记录、小农户集体备案文件；

   ●NDPE 专项材料：供应商自主填报 NDPE IRF 风险自评表、年度内部环境自查报告、历史不合规整改证明、泥炭地修复合作计划。 管控规则：高风险供应商按月更新产地动态资料；中低风险供应商每年完成资料复核更新；2023 年起所有供应商必须提交可验证卫星影像、土地权属合规证据，2024 年对无整改方案高风险供应商启动淘汰（年度淘汰目标 20%）。

3. Satellite monitoring of your supplying areas（供应产区卫星遥感监测）

   依托 GIS 地理信息系统 + 多渠道卫星影像工具（Starling、GFW、无人机遥感），对所有原料地块开展常态化动态监测，落地集团供应链透明度 KPI 管控要求：

   ●调取地块多年历史卫星影像，对比 2020.12.31 前后植被覆盖变化，判定是否存在原始林、泥炭地清砍行为；

   ●接入 Starling、GFW 自动森林损耗警报，印尼、马来西亚等高风险产区设置实时预警，出现新增毁林立即启动专项复核；

   ●GIS 图层叠加比对：将种植园坐标与保护区、濒危物种栖息地、泥炭地边界匹配，测算缓冲区内毁林潜在风险，支撑泥炭地复湿试点选址；

   ●卫星影像数据与供应商提交土地档案交叉验证，排查虚假产地、瞒报土地变更等问题；

   ●长期数据用于核算年度 KPI：基于卫星监测数据确保 2025 年毁林关联采购量降至零。

4. On site visits（实地现场走访审核）

匹配集团年度第三方审计机制，结合卫星、档案筛查结果分级实施现场审核，覆盖集团合资、子公司、第三方供应商全范围：

- ●分级走访规则：卫星监测、NDPE 档案筛查判定为中、高风险的供应商与产区，实施年度现场审核；低风险供应商每 2 年抽样实地走访；2025 年前完成全部存量高风险供应商现场复核；
- ●核查范围：油棕种植园、鲜果收购站、棕榈压榨厂、脂肪酸精炼上游加工厂、小农集中种植片区（配套无人机地块辅助核查）；
- ●现场核验内容：实地核对地块边界、开发时间、HCV 野生动物走廊落地、泥炭地保护措施、小农户经营现状、土地冲突、劳工权益，同步核查匿名投诉整改落地情况；
- ●取证要求：现场实景拍照、调取原始生产台账、访谈当地社区与小农，出具正式 SMETA 配套现场审核报告作为风险评级核心依据；
- ●闭环管理：现场核查发现毁林、泥炭开发、剥削类不合规问题，出具限期整改方案，逾期未完成纳入 2024 年度供应商淘汰清单，后续回访验证整改成效。

风险评估数据来源应当多元化，包括但不限于：供应商问卷调查、现场审核报告、第三方认证数据、卫星监测图像、政府土地用途记录、非政府组织研究报告等。地理信息系统(GIS)和遥感技术在森林覆盖变化监测中的应用也越来越广泛，如 Global Forest Watch 等平台提供近乎实时的森林变化警报。

风险评估周期应当与业务周期和风险动态相匹配。建议至少每年进行一次全面风险评估，对于高风险供应商或产区，则应提高评估频率。同时，建立重大风险事件的即时响应机制，如当某产区发生大规模非法砍伐被曝光时，能够快速评估对公司供应链的潜在影响并采取相应措施。

风险分类与评级体系

森林砍伐与转化风险可根据来源和性质分为以下几类：

1. 直接砍伐风险：指油棕种植直接导致原始森林、保护林地或高碳储量(HCS)区域的清除。这是最严重的一类风险，可能引发法规处罚、品牌声誉损害和市场准入限制。评估指标包括：种植园开发时间(是否在 2020 年 12 月 31 日后)、土地转化前的植被类型、是否存在保护区侵占等。

配套评估方法：卫星遥感监测、现场实地走访为主，案头研究、供应商 NDPE 档案收集作为初筛佐证

2. 间接砍伐风险(ILUC)：指因油棕种植导致的土地用途间接变更，如将其他农业用地转为油棕种植，迫使原有作物种植向森林区域扩张。欧盟可再生能源指令(REDII)中的 ILUC 标准正是针对此类风险。评估指标包括：区域性的土地利用变化模式、农作物种植结构调整趋势等。

配套评估方法：案头研究区域土地变化数据、卫星长期影像比对、供应商产区规划档案收集

3. 社会合规风险：指与油棕种植相关的土地权属冲突、原住民权利侵害、劳工权益问题等。虽然不直接关联森林砍伐，但这些社会问题往往与环境破坏交织在一起。评估指标包括：土地获取程序的合法性、自由事先知情同意(FPIC)实施情况、劳工条件等。

配套评估方法：供应商合规档案收集、现场实地走访社区访谈、案头研究当地土地纠纷公示信息

4. 监管合规风险：指因不符合国内外法规要求而导致的法律后果和商业损失。欧盟《零毁森林法案》(EUDR)和各国可持续棕榈油政策构成了主要的监管框架。评估指标包括：产品是否符合目标市场的可持续性要求、供应商的合规记录等。
配套评估方法：案头法规比对、供应商 NDPE IRF 及认证档案收集、高风险供应商现场复核

风险评级可采用三级或五级制，根据风险发生的可能性和影响的严重性进行综合评定。例如：
- 高风险：有明确证据表明供应商涉及原始森林砍伐或泥炭地开发；无法提供可信的追溯信息；多次违反环境法规。
- 中风险：部分种植园位于次生林或退化林地，但缺乏明确的可持续管理计划；追溯系统不完善但正在改进。
- 低风险：种植园位于已有农业用地，无森林转化历史；拥有完善的追溯系统和可持续认证。

关键评估指标

基于风险的评估指标体系应当量化各类风险的表现形式和严重程度。以下是针对棕榈油衍生脂肪酸供应链的核心评估指标：

表：棕榈油衍生脂肪酸供应链森林砍伐风险评估指标

指标类别	具体指标	数据来源	风险等级判断标准	对应评估方法
土地用途历史	种植园开发时间	土地权属文件、卫星图像	2020 年 12 月后开发为高风险	供应商档案收集、卫星监测、案头研究
	转化前土地类型	历史卫星图像、政府记录	原始森林或泥炭地为高风险	卫星监测、案头研究、现场走访
	与保护区距离	GIS 空间分析	缓冲区内的种植园风险较高	卫星监测 GIS 分析、案头研究
可持续实践	RSPO 认证状态	RSPO 证书、供应链模型	未认证为高风险，MB/SG 优于 B&C	供应商档案收集、现场走访、案头研究
	高保护价值(HCV)评估	HCV 评估报告	未评估或评估不完整为风险	供应商档案收集、现场走访复核
	泥炭地管理政策	公司政策文件、现场审核	无政策或政策执行不力为风险	供应商档案收集、现场走访
追溯与透明	供应链追溯能力	供应商调查、追溯系统测试	无法追溯至种植园为高风险	供应商档案收集、现场走访、卫星监测
	第三方验证比例	审计报告、认证数据	低验证比例增加风险	供应商档案收集、案头研究
社会合规	土地权属清晰	土地所有权文	权属争议为高风险	供应商档案收

	度	件、社区访谈		集、现场走访社区访谈
	FPIC 实施情况	社区协商记录	未实施 FPIC 为高风险	供应商档案收集、现场走访
	劳工权益保障	劳工政策、审核发现	存在强迫劳动或童工为高风险	供应商档案收集、现场走访核查

风险热图工具可直观呈现不同供应商和产区的风险分布。将上述指标评估结果整合后，可以绘制基于地理信息系统(GIS)的风险热图，帮助采购决策者快速识别高风险区域，优化供应商组合。例如，秘鲁亚马逊地区近期被曝光存在大规模非法砍伐活动，在该区域的供应商应被标记为高风险，需加强尽职调查或考虑替代来源。

风险评估的动态性不容忽视。棕榈油供应链风险随政策变化、市场波动和环境条件而不断演变。例如，马来西亚和印度尼西亚针对欧盟《零毁森林法案》的应对措施，或气候异常对种植产量的影响，都可能改变特定区域的风险状况。因此，风险评估框架应当具备足够的灵活性，能够及时纳入新的风险因素和信息更新。

可持续棕榈油圆桌倡议(RSPO)认证体系

RSPO 认证已成为行业公认的可持续棕榈油主要标准。该认证体系包含八项原则和 39 项标准，涵盖合法合规、环境保护、社区权益等多个方面。截至 2022 年，全球 RSPO 认证面积达 450 万公顷，分布在 21 个国家，保护了超过 30.1 万公顷的园地。经 RSPO 认证的棕榈油相比传统棕榈油可减少约 35%的碳排放。

RSPO 供应链模型提供了四种追溯选项，按严格程度从高到低依次为：身份保持(Identity Preserved, IP)、隔离(Segregated, SG)、质量平衡(Mass Balance, MB)和簿记信用(Book & Claim, B&C)。

RSPO 在中国的推广面临独特挑战。作为全球第二大棕榈油进口国，中国采购可持续棕榈油的比例 2021 年仅达到 8%，离 RSPO 设定的 10%目标仍有差距。主要障碍包括终端消费者认知度低、棕榈油在产品标签中"隐形"（常标注为"植物油"或化学名称），以及企业缺乏采购动力。针对这些挑战，RSPO 中国区采取的策略包括：通过跨国企业带动本土供应商、推动头部中国企业加入 RSPO、参与政策制定等。

应对欧盟新法规的策略尤其值得关注。随着 EUDR 实施临近，领先企业正加强供应链尽职调查系统，确保能证明产品不涉及 2020 年 12 月后的森林砍伐。这包括收集更详细的产地信息、投资于追溯技术、与供应商共同应对合规挑战等。

风险管理与改进建议

基于全面的风险评估和行业最佳实践分析，本部分提出针对性的风险管理策略和改进建议，帮助公司有效降低棕榈油衍生脂肪酸供应链中的森林砍伐与转化风险。这些建议涵盖政策制定、供应商管理、追溯系统建设、利益相关方参与等多个维度，形成一套系统化的风险管理框架。实施这些措施将不仅有助于合规和风险规避，还能提升公司可持续形象，创造长期竞争优势。

制定可持续棕榈油采购政策

明确的书面政策是可持续采购的基础和公开承诺。建议公司制定并发布《负责任棕榈油衍生品采购政策》，内容应包括：

1. 零毁林承诺：明确排除涉及原始森林、高碳储量(HCS)森林、高保护价值(HCV)区域和泥炭地开发的棕榈油原料，与欧盟《零毁森林法案》时间线保持一致，即不接受 2020 年 12 月 31 日后涉及毁林的原料。
2. 认证目标：设定逐步提高 RSPO 认证比例的明确时间表，到 2025 年实现 100% RSPO 认证供应，其中至少 50%来自实体供应链(MB/SG)"。这一目标应定期评估和更新，反映业务发展和市场变化。
3. 供应商期望：要求所有棕榈油衍生脂肪酸供应商遵守公司的可持续采购原则，提供完整的供应链追溯信息，并配合第三方审核。政策中应明确不符合要求的后果，包括业务关系重新评估。
4. 小农户包容：承诺支持小农户的可持续转型，通过能力建设、技术援助或融资支持帮助他们达到可持续标准。这是解决小农户融入问题的关键，也是马来西亚和印尼政府高度关注的议题。
5. 透明与报告：承诺定期(至少每年)公开披露采购政策和目标的实施进展，包括 RSPO 认证比例、追溯覆盖率、供应商合规情况等指标。透明度建设是赢得利益相关方信任的关键。

建立完善的供应链追溯系统

端到端的可追溯性是风险管理的核心技术基础。针对棕榈油衍生脂肪酸供应链的特殊复杂性，建议采取以下措施：

1. 供应链映射：首先绘制完整的供应链图谱，识别所有直接和间接供应商，直至种植园层面。对于无法直接追溯的环节(如衍生物生产中的混合过程)，要求供应商提供质量平衡记录或交易证书。
2. 数字追溯平台：投资建设或采购供应链追溯管理系统，整合供应商提供的数据、认证信息、审核报告等。考虑采用区块链技术增强数据的不可篡改性，特别是对于高风险区域和供应商。

平台内置卫星遥感监测对接模块，自动调取 GIS 林地图层，实现案头研究、卫星监测数据一体化线上管理；高风险供应商每年配套线下现场走访，线上数据核验 + 线下实地核查形成双重验证机制

3. 地理定位验证：利用卫星图像和 GIS 技术验证种植园位置和土地用途历史。平台如 Global Forest Watch 提供森林变化警报，可帮助识别新发生的砍伐活动。
4. 第三方审核：对高风险供应商和产区进行现场审核，验证其提供信息的真实性。审核应涵盖环境和社会两个维度，特别关注土地权属、FPIC 流程、劳工条件等敏感问题。
5. 持续监测：建立供应链的持续监测机制，而非一次性评估。设置关键风险指标(KRI)和预警阈值，当发现异常情况(如某产区突然出现大量森林损失警报)时触发特别调查。

追溯系统实施应分阶段进行，优先覆盖高风险产品和供应商。初期可接受部分供应链尚未完全透明，但必须制定明确的时间表逐步提高追溯覆盖率。同时，注意数据隐私和商业机

密保护，在透明度和合理保密之间取得平衡。

供应商能力建设与参与

供应商是风险管理的关键伙伴而非单纯合规对象。鉴于马来西亚和印尼约 30-40%的油棕由小农户生产，将他们排除在供应链之外既不现实也不公平。建议采取以下参与策略：

1. 供应商分级：根据风险评估结果将供应商分为高、中、低风险三类，针对不同级别设计差异化的管理措施。高风险供应商需要立即整改或替换；中风险供应商可给予改进机会；低风险供应商则可建立更紧密的伙伴关系。
2. 能力建设项目：为有改进意愿但能力不足的供应商(特别是小农户集体组织)提供培训和技术支持，内容包括：可持续种植实践、记录保存、认证准备等。可联合 RSPO、行业协会或其他买家共同开展，分摊成本。
3. 经济激励机制：为可持续生产的原料提供价格溢价或长期采购承诺，弥补供应商的认证和合规成本。这种"可持续溢价"是激励行为改变的有效手段，特别是对小农户而言。
4. 申诉与纠正机制：建立正式的申诉流程，当发现供应商不合规时，首先给予纠正机会而非立即终止合作。
5. 集体行动倡议：参与或发起行业集体行动项目，如"可持续棕榈油倡议"(SPOA)或区域性的小农户支持计划。集体行动可以分摊成本、共享资源，并避免重复工作。

供应商参与的关键在于建立长期互惠关系，而非单纯施压。通过定期对话、联合问题解决和能力建设，将可持续性要求转化为供应商的内在动力，从而实现真正的行为改变和持续改进。

利益相关方参与与行业协作

森林砍伐是系统性挑战，需要跨部门、跨价值链的协作解决。建议公司从以下方面加强外部参与：

1. 加入 RSPO：成为可持续棕榈油圆桌倡议组织成员，参与标准制定和行业对话。RSPO 中国成员已超过 300 家，形成了本地化的知识网络和合作平台。
2. 政策对话：关注并参与相关法规的制定过程，如欧盟《零毁森林法案》的实施细则、中国可能的可持续棕榈油政策等。通过行业协会或联合声明表达行业关切和可行建议。
3. NGO 与学术合作：与世界自然基金会(WWF)、绿色和平等环保组织，以及研究机构建立对话和合作渠道。这些组织通常拥有前沿的森林监测数据和深入的产区洞察，可补充公司的风险评估。
4. 消费者教育：虽然脂肪酸衍生物不直接面向消费者，但可支持行业层面的消费者教育，提高对可持续棕榈油的认知。RSPO 中国的经验显示，消费者意识提升能创造市场拉动效应。
5. 投资者沟通：将可持续棕榈油采购进展纳入 ESG 报告，与关注环境和社会责任的投资者保持定期沟通。越来越多的投资者将森林保护作为评估公司的重要指标。

协作的关键在于明确目标、贡献专长和衡量影响。避免"为协作而协作"，确保每次参与都能带来实质性的风险降低或改进机会。同时，注意平衡不同利益相关方的期望，寻找各方都能接受的解决方案。

实施路线图与资源分配

将建议转化为具体行动计划需要清晰的实施路线图和资源保障。建议按以下阶段推进：

表：棕榈油衍生脂肪酸供应链风险管理实施路线规划

时间框架	关键行动	负责部门	成功指标
2022-2023	1. 成立跨部门工作组 2. 制定可持续采购政策草案 3. 开展初步供应链风险评估	采购部牵头，可持续发展、法务等部门参与	工作组成立；政策草案完成；高风险供应商识别
2023-2024	1. 搭建案头研究数据库，统一供应商 NDPE IRF 收集模板 2. 上线卫星遥感 GIS 监测工具 3. 正式发布采购政策 4. 实施供应商调查 5. 选择并部署追溯系统 6 加入 RSPO	采购部、IT 部	政策发布；供应商调查完成率>80%；卫星监测系统落地，完成首轮全供应商案头风险初筛；系统选型确定；RSPO 会员资格获得
2025	1. 对全部高风险供应商 100% 开展 On site visits 现场审核 2. 关键供应商审核 3. 启动能力建设项目 4. 首次可持续采购比例报告 5. 建立申诉机制	采购部、可持续发展部	高风险供应商审核覆盖率 100%；卫星监测常态化预警机制稳定运行；培训项目启动；首份报告发布；机制建立
2025-2030	1. 扩大追溯覆盖范围 2. 参与行业协作倡议 3. 评估政策效果并调整 4. 探索创新解决方案	跨部门团队	追溯覆盖主要产品线；参与 1-2 个行业项目；政策修订完成；创新试点启动

风险评估的核心发现

供应链风险的高度集中性是评估的首要发现。全球棕榈油生产的 83%集中在印度尼西亚和马来西亚，而这两个国家的油棕种植与森林砍伐有着历史性关联。根据世界银行数据，1990-2020 年间印尼损失了超过 2640 万公顷原始森林，同期油棕种植面积从 110 万公顷扩张至 1638 万公顷。这种地理和产业集中度意味着风险管理可以聚焦于少数关键区域，但也

增加了区域性事件对全球供应链的冲击风险。

小农户整合挑战构成了风险管理的特殊复杂性。印尼 41%和马来西亚 26%的油棕种植面积由小农户经营，这些生产者通常缺乏资源和技术能力实施可持续实践或满足日益严格的追溯要求。欧盟《零毁森林法案》的实施可能将这些小农户排除在供应链之外，引发生计问题和社会反弹。完全规避小农户来源既不现实也不公平，如何支持他们向可持续生产转型成为行业共同挑战。

衍生物供应链的不透明性增加了追溯难度。与原油相比，棕榈油衍生脂肪酸通常经过多次加工和混合，原始种植信息容易在供应链中丢失。公司与棕榈油和棕榈仁油的原产地相隔甚远，这种不透明性使得风险评估必须依赖供应商声明、认证体系和抽样验证的结合，而非完整的端到端追溯。

法规环境的快速演变带来了新的合规要求。欧盟《零毁森林法案》将于 2024 年 12 月 30 日强制实施，要求企业证明其产品不涉及 2020 年 12 月 31 日后的森林砍伐。同时，马来西亚和印尼等国已向 WTO 提出申诉，认为此类法规构成贸易壁垒。这种政策动态性要求企业的风险管理体系具备足够的灵活性和适应性。

本套风险评估体系完全对齐集团《棕榈油可持续采购战略时间线（2022-2030）》分阶段管控目标：2022 年完成供应链基线摸排；2025 年达成阶段性追溯、RSPO 量化指标，高风险问题减少 50%，初步实现 NDPE 合规；2030 年达成全供应链零毁林、零泥炭开发、零剥削。报告采用案头研究、NDPE IRF 档案收集、卫星遥感、现场走访四类分层评估方法，依据供应链位置、产地风险差异化选用，完整满足 NDPE、SPI 评审对评估方法细化要求。

风险管理策略的价值主张

主动的风险管理能够为公司创造多重价值，远超越简单的合规和风险规避：

1. 业务连续性保障：通过确保供应链符合主要市场的法规要求(如 EUDR)，避免产品被拒、罚款或没收等商业中断风险。随着越来越多国家和地区出台类似法规，提前布局可持续供应链将成为市场准入的前提条件。
2. 品牌声誉提升：在环保意识日益增强的背景下，负责任采购实践能增强品牌美誉度，差异化市场定位。相反，如 EIA 报告所示，与毁林关联的供应链可能引发消费者抵制和 NGO 批评。
3. 成本与供应稳定：虽然可持续棕榈油可能带来短期成本增加，但长期看有助于稳定供应关系，减少由环境争议或法规变化导致的供应链震荡。
4. 创新与合作机会：参与可持续棕榈油倡议(如 RSPO)可带来行业网络、知识共享和联合创新机会。这些无形资产可能转化为新产品、新市场或效率提升。
5. 投资者吸引力：越来越多的投资者将环境和社会治理(ESG)因素纳入决策考量。完善的可持续供应链管理能提升 ESG 评级，获得更多负责任投资者的青睐。

价值实现的路径在于将风险管理融入核心业务决策，而非视为附加的合规负担。采购决策应综合考虑价格、质量和可持续表现，与战略供应商建立基于共同价值的长期伙伴关系，并将可持续性要求逐步扩展到更广泛的供应链。

立即行动（2025 年更新：1-4 已完成）

1. 组建跨职能团队：由采购部门牵头，联合可持续发展、法务、研发等部门成立可持续棕榈油工作组，负责策略制定和执行监督。明确各成员的职责和关键绩效指标。

2. 制定并发布采购政策：起草《负责任棕榈油衍生品采购政策》，包含零毁林承诺、认证目标、供应商期望等核心要素。政策制定过程应咨询关键供应商和内部利益相关方意见。

3. 开展供应商风险评估：对现有棕榈油衍生脂肪酸供应商进行初步风险筛查，重点关注：原料产地(是否来自印尼/马来西亚高风险区域)、认证状态、追溯能力等。根据风险评估结果对供应商分级并制定差异化管理策略。

4. 加入 RSPO：申请成为可持续棕榈油圆桌倡议组织成员，参与相关培训和活动，了解行业最佳实践。RSPO 中国区已有超过 300 家成员，形成了本地化的知识网络。

5. 投资追溯系统：评估并选择适合公司规模和需求的供应链追溯解决方案，可能包括区块链平台、GIS 工具或专业供应链管理软件。初期可优先覆盖高风险产品和供应商，逐步扩展覆盖范围。

6. 启动供应商沟通：向现有供应商传达公司的可持续采购政策，解释期望和要求，了解他们的准备情况和挑战。这种对话有助于识别实际障碍和合作改进机会。

长期改进方向

1. 提高认证比例与质量：从 RSPO 簿记信用(B&C)逐步转向质量平衡(MB)和隔离(SG)模型，提高供应链的可追溯性和透明度。设定年度递增的认证比例目标，并公开报告进展。

2. 支持小农户转型：配套 NDPE IRF 档案填报、卫星地块管理、可持续种植专项培训，稳步提升小农认证比例至 2030 年 50%，同步纳入区域泥炭地复湿、社区收入多元化项目，2030 年实现 80% 供应链周边社区生计改善覆盖参与或发起小农户能力建设项目，帮助其达到可持续标准并获取认证。这不仅能扩大可持续原料供应，也有助于社区发展和供应链韧性建设。

3. 探索创新解决方案：评估棕榈油替代品的可行性，如中国海南研究的 59 种非粮生物柴油植物，或投资于提高棕榈油利用效率的技术创新。长期看，原料多样化可降低供应链风险。

4. 加强行业领导力：通过分享最佳实践、参与标准制定、倡导政策改革等方式，在行业内发挥领导作用。可持续棕榈油的系统性变革需要先锋企业的示范和推动。

5. 整合循环经济理念：探索棕榈油副产品的增值利用或废油回收项目，提升资源利用效率。例如，污泥厌氧发酵产挥发性脂肪酸的技术可能提供额外原料来源。

6. 生态修复与气候水资源长效管控：按计划完成 10000 公顷 HCV/HCS 退化林地修复，全合作种植园落地野生动物保护走廊；落地 SBTi 科学碳减排目标，推进农林复合低碳种植削减化肥与水资源消耗；每年完成 CDP、WEF 热带森林联盟环境数据报送，常态化披露林地

修复、碳减排、水资源管控成效。

Released in July 2022
First revision in April 2025
Second revision in June 2026
Version: A2

Risk Assessment Report on Forest Deforestation and Transformation in the Supply Chain of Palm Oil-Derived Fatty Acids

This report aims to conduct a comprehensive assessment of potential risks related to deforestation and land conversion within the supply chain of palm oil-derived fatty acid products procured by companies. Given the growing global demand for sustainable palm oil and increasingly stringent regulatory requirements in regions such as the European Union, supply chain transparency and sustainability have become critical components of corporate risk management. The report analyzes the environmental and social impacts of the palm oil industry, evaluates current supply chain risks, and proposes a comprehensive set of risk management strategies and improvement recommendations to help companies establish more resilient sustainable supply chain systems.

executive summary

This risk assessment report provides a systematic analysis of deforestation and land conversion risks within the supply chain of palm oil-derived fatty acid products procured by the company. As the world's most produced vegetable oil, palm oil production has drawn significant international attention due to its associated deforestation issues, particularly in major producers Indonesia and Malaysia, where the expansion of oil palm plantations has led to extensive loss of primary forests. Key findings indicate that the primary risks in the palm oil supply chain are concentrated in the following areas:

– Lack of transparency in raw material sources: Approximately 41% of oil palm cultivation in Malaysia and 26% in Indonesia is conducted by small farmers, and these small-scale plantations often lack comprehensive traceability systems.

-Regulatory compliance risk: The EU's Zero Deforestation Regulation (EUDR) will come into force in December 2024, requiring all palm oil products entering the EU market to demonstrate that they do not involve forest harvesting occurring after December 31,2020.

-Market and reputation risks: Several international brands face consumer boycotts and criticism from NGOs due to links between their supply chains and deforestation.

-Price volatility risk: Climate factors and policy changes are expected to drive palm oil prices to a historic high of RM4,600 per ton by 2025.

Through an analysis of industry-leading practices, this report recommends that the company implement the following key measures:

1. Establish a comprehensive supply chain traceability system to ensure full traceability from fatty acid products to oil palm plantations.
2. Prioritize the procurement of RSPO-certified sustainable palm oil derivatives and gradually increase the proportion within the physical supply chain (MB/SG).
3. Implement a supplier capacity-building program, particularly providing sustainable farming training for small-scale farmers.
4. Develop a transparent sustainable palm oil procurement policy and regularly disclose progress updates.
5. Participate in industry initiatives and collaborate with multiple stakeholders to drive systemic change

Implementing these recommendations will help companies effectively mitigate environmental and social risks across their supply chains, ensure business continuity, enhance brand reputation, and comply with increasingly stringent regulatory requirements.

Introduction and Background

Palm oil and its derivatives, as the most widely used vegetable oil globally, have become indispensable raw materials for modern industry. From food and cosmetics to detergents and biofuels, palm oil-derived fatty acid products are extensively utilized due to their unique physicochemical properties and cost-effectiveness. Global palm oil production increased from 74.17 million tons in 2018 to 77.58 million tons in 2022, with Indonesia and Malaysia accounting for approximately 84% of total output; their combined palm oil plantation area reached 19 million hectares. However, this massive industry presents significant environmental and social challenges.

Deforestation and land conversion have become the most contentious issues in the palm oil industry. According to data from the United Nations Development Programme, converting virgin forests into oil palm plantations reduces native biodiversity by 83%. World Bank statistics show that between 1990 and 2020, over 26.4 million hectares of primary forest disappeared in Indonesia, while the country's oil palm plantation area surged from 1.1 million hectares to 16.38 million hectares during the same period. This large-scale deforestation not only leads to biodiversity loss but also releases substantial amounts of stored carbon, exacerbating climate change. It is estimated that deforestation and forest degradation contribute approximately 10% of global greenhouse gas emissions.

International attention and regulatory scrutiny regarding this issue have continued to grow. In 2018, the European Union revised its Renewable Energy Directive (RED II), aiming to phase out palm oil-based biofuels by 2030. In June 2023, the EU's Zero Deforestation Regulation (EUDR) came into force and will be mandatory as of December 30,2024, prohibiting the sale in the EU market of seven commodities linked to deforestation, including palm oil. The regulation requires companies to conduct due diligence to demonstrate that their products do not involve deforestation occurring after December 31,2020; failure to comply may result in fines or product seizures.

The complexity of the supply chain poses significant challenges to the sustainable procurement of palm oil-derived fatty acid products. The palm oil supply chain typically involves multiple

intermediate stages: from oil palm plantations through crushing plants, refineries, and derivative producers to end-product manufacturers. Particularly in the field of derivatives such as fatty acids, raw materials often undergo multiple mixing and processing steps, making it extremely difficult to trace their original planting sources. Furthermore, approximately 30–40% of oil palms in Indonesia and Malaysia are cultivated by small farmers, who often lack the resources and technical capacity to implement sustainable practices or participate in certification programs.

Corporate risk awareness is rapidly increasing. A growing number of consumer goods companies and chemical firms recognize that deforestation risks within supply chains not only impact corporate reputation but may also affect market access and financing conditions. The Environmental Impact Assessment (EIA) 2024 report revealed that palm oil suppliers for several multinational corporations were linked to illegal deforestation in the Amazon region of Peru, drawing widespread attention. Meanwhile, rising demand from investors and consumers for sustainable products is driving companies to enhance supply chain transparency and management practices.

The purpose of this report is to assist the company in systematically identifying, assessing, and managing deforestation and conversion risks within the palm oil-derived fatty acid supply chain; to draw on industry best practices; to develop actionable improvement measures; to ensure supply chain sustainability and compliance; and to meet the growing expectations of stakeholders.

Analysis of the Palm Oil Industry and the Current State of Forest Deforestation

The global palm oil industry exhibits a highly concentrated structure across production, trade, and consumption sectors. As the world's largest vegetable oil producer, global palm oil output reached 77.58 million tons in 2022, with Indonesia accounting for 46 million tons (59.3%) and Malaysia contributing 18.6 million tons (24%), together representing over 83% of total production. In terms of cultivation area, the global oil palm plantation covered 26.519 million hectares in 2022: Indonesia alone accounted for 13.5 million hectares (50.9%), Malaysia 5.5 million hectares (20.7%), and Nigeria 3 million hectares (11.3%). This geographical concentration allows supply chain risk assessments to focus on a few key production regions, but also amplifies the impact of regional risks on the global market.

Current situation of forest deforestation in the producing countries

As the world's two leading palm oil producers, Indonesia and Malaysia have seen a well-documented link between their expansion of oil palm cultivation and deforestation. According to World Bank data, Indonesia lost over 26.4 million hectares of primary forest between 1990 and 2020, while its oil palm plantation area grew from 1.1 million hectares to 16.38 million hectares during the same period. A United Nations Development Programme report states that converting primary and logged forests into oil palm plantations reduces species diversity by 83%. In Malaysia, particularly in Sabah and Sarawak, the expansion of oil palm plantations has similarly come at the expense of tropical rainforests, threatening habitats of endangered species such as orangutans and pygmy elephants.

The issue of deforestation in emerging oil-producing regions such as Peru and Colombia has

become increasingly prominent. A 2024 report by the Environmental Impact Assessment Agency (EIA) revealed that palm oil and cocoa companies in Peru's Amazon region have driven large-scale deforestation, involving over 13,000 hectares of illegal logging. More concerning is the recent passage of a forest law amendment by the Peruvian Congress that condones historical illegal logging practices, potentially leading to further conversion of forests into agricultural land. Weak regulatory frameworks and governance deficiencies in these emerging regions pose additional challenges for supply chain risk assessment.

Flow patterns of palm oil trade and market dynamics

The global palm oil trade landscape exhibits distinct "south-to-north" and "east-to-west" characteristics. In 2022, global palm oil exports reached 49.4 million tons, with Indonesia accounting for 57.1% (28.2 million tons) and Malaysia for 32% (15.8 million tons). Imports were relatively dispersed, with major importing countries including India (8.3 million tons), China (7.2 million tons), the European Union (5.9 million tons), and Pakistan (3.6 million tons). Notably, China, as the world's second-largest palm oil importer and third-largest consumer, saw its imports decline overall from 2018 to 2022, reaching a five-year low of 4.9435 million tons in 2022.

Price volatility and market uncertainty are exacerbating supply chain risks. Malaysian Rating Corporation Bhd (MARC Ratings) forecasts that palm oil prices could reach a historic high of RM4,600 per ton by 2025. Key drivers of price increases include reduced Indonesian exports, adverse weather conditions in Malaysia, and policy restrictions in markets such as the EU. Such price fluctuations not only impact procurement costs but may also lead suppliers to prioritize short-term profits over sustainable practices, thereby increasing deforestation risks.

The Role and Challenges of Small Farmers in the Supply Chain

The smallholder farming model holds a significant position in major producing countries. Data from 2022 show that 41% of oil palm cultivation areas in Indonesia and 26% in Malaysia are managed by small farmers. These small farmers often lack the capital, technical expertise, and management skills required for sustainable farming practices, and find it difficult to bear certification costs. The implementation of the EU's Forest Stewardship Council (FSC) Act may exclude these small farmers from global supply chains, severely impacting their livelihoods. Indonesia and Malaysia have repeatedly protested to the WTO, arguing that the act effectively creates import barriers that exclude agricultural products from developing countries.

Small farmers face multiple obstacles in integrating into sustainable supply chains. First, unclear land ownership is a widespread issue in many production regions, as small farmers often lack valid land ownership documentation. Second, inadequate production recording and traceability systems make it difficult for their products to meet due diligence requirements of markets such as the EU. Third, market information asymmetry and exploitation by intermediaries limit the price premiums small farmers can command, diminishing their economic incentive to participate in sustainability certification. These structural challenges require industry-wide collaboration to address effectively.

Table: Structure of Cultivated Area in Major Palm Oil Producing Countries (2022)

country	Total planting area (ten thousand hectares)	Proportion of small farmers (%):	Proportion of corporate plantations (%):
Indonesia	1350	41	59
Malaysia	550	26	74
Nigeria	300	/	/
Global Total	2651.9	Approximately 30–35 (estimated)	Approximately 65–70 (estimated)

Supply Chain Risk Assessment Framework

Establishing a systematic risk assessment framework forms the foundation for managing deforestation and conversion risks in the palm oil-derived fatty acid supply chain. This section details the evaluation methodology, risk classification system, and specific assessment indicators, providing companies with a practical supply chain risk assessment tool. The framework integrates internationally recognized standards, industry best practices, and the unique characteristics of the palm oil supply chain, ensuring comprehensive yet targeted assessment outcomes.

Risk Assessment Methodology

Supply chain mapping and traceability constitute the fundamental steps in risk assessment. For palm oil-derived fatty acid products, a complete supply chain typically encompasses the following segments: oil palm plantations → fresh fruit cluster collection stations → palm fruit pressing mills → palm oil refineries → fatty acid production plants → final product manufacturers. Risk assessment requires tracing each link along this chain to identify potential risks of deforestation and land conversion at every stage. In practice, a "back-to-front" traceability approach can be employed: first requiring direct suppliers to provide raw material source information, then progressively tracing upstream to the plantation level.

This project incorporates multiple risk assessment tools for forest harvesting and land conversion, allowing enterprises to select tailored solutions based on their supply chain segments, raw material origins, and operational characteristics. The suite comprises four standardized evaluation methods:

1. Desk Research

   As a fundamental tool for comprehensive risk screening across the entire supply chain, it integrates publicly available third-party data in bulk to establish basic risk classifications for production regions and suppliers. Data sources include:

   - Global forest traceability platforms: Global Forest Watch, Trase, and Starling satellite systems publicly release data on forest loss;

- Official regulatory documents: EUDR Due Diligence Guidelines, Indonesian/Malaysian Forestry Land Management Regulations, Group's NDPE Procurement Policy, supplier contract obligations, and the New York Forest Declaration commitment document;

- Third-party publicly available research materials: forest deforestation investigation reports from NGOs such as EIA and WWF, RSPO industry annual reports, land change registration records of governments worldwide, and CDP's publicly disclosed environmental data.

- Historical Risk Register: Media reports on illegal logging incidents, corporate environmental penalty notices, labor complaint records, and SMETA audit history reports. Through desk research, high-risk regions such as Sumatra (Indonesia) and Sabah (Malaysia) are promptly identified, with audit resources prioritized to support the 2022 baseline risk assessment and annual sustainability report preparation.

2. Collection of evaluation data from known direct and indirect suppliers (collection of supplier evaluation records)
3. This initiative covers all primary oil mills, secondary plantation suppliers, and third-party partners within the group, mandating the collection of standardized risk documentation. Key documents include NDPE IRF files, establishing a unified supplier risk database for the entire group.

- Land ownership documents: property title certificate for the plot, development sequence certification dated before or after December 31,2020, original vegetation type of the plot, and HCV/HCS high-value forest land classification records;

- Sustainable certification documents: the complete RSPO supply chain certification package (including IP/SG/MB/B&C classification records), independent HCV/HCS assessment reports, and pilot schemes for peatland management and wetland restoration;

- Social compliance documents: Indigenous FPIC Free Prior Informed Consent forms, labor rights review records, and collective filing documents for small farmers;

- NDPE Special Materials: Suppliers must independently submit the NDPE IRF Risk Self-Assessment Form, annual internal environmental self-inspection report, proof of historical non-compliance rectification, and peatland restoration cooperation plan. Control Requirements: High-risk suppliers shall update their origin-related information monthly; medium-and low-risk suppliers shall complete annual data verification and updates; starting in 2023, all suppliers must submit verifiable satellite imagery and land ownership compliance documentation; beginning in 2024, high-risk suppliers lacking a rectification plan will be subject to elimination (annual elimination target: 20%).

4. Satellite monitoring of your supply areas (satellite remote sensing monitoring of production regions)

By leveraging GIS geographic information systems combined with multi-source satellite imagery tools (Starling, GFW, and drone remote sensing), we conduct regular dynamic monitoring of all raw material sites, thereby fulfilling the Group's supply chain transparency KPI management requirements.

- Extract multi-year historical satellite imagery of the plot, compare vegetation cover changes before and after December 31,2020, and determine whether there was any clear-cutting activity in primeval forests or peatlands;

- Integrate with Starling and GFW automated deforestation alerts, enabling real-time warnings in high-risk regions such as Indonesia and Malaysia; initiate immediate specialized reviews upon detecting new deforestation cases.

- GIS layer overlay analysis: Match plantation coordinates with protected areas, endangered species habitats, and peatland boundaries to assess potential deforestation risks within buffer zones and support site selection for peatland restoration projects.

- Cross-verify satellite imagery data with land records submitted by suppliers to identify issues such as false origin claims and concealed land changes;

- Long-term data is used to calculate annual KPIs: Satellite monitoring data ensures that deforestation-related procurement volumes will drop to zero by 2025.

5. On-site visits (physical inspections and reviews)

Aligned with the Group's annual third-party audit mechanism, we conduct tiered on-site audits based on satellite monitoring and archival screening results, covering all entities including joint ventures, subsidiaries, and third-party suppliers.

- Tiered visitation protocol: Suppliers and production areas identified as medium or high-risk through satellite monitoring and NDPE file screening shall undergo annual on-site audits; low-risk suppliers shall be sampled for field visits every two years; all existing high-risk suppliers shall complete comprehensive on-site re-evaluations by 2025.

- Scope of verification: oil palm plantations, fresh fruit purchasing stations, palm oil pressing plants, upstream fatty acid refining facilities, and small-scale concentrated farming areas (with drone-assisted verification in designated plots).

- On-site verification scope: verify plot boundaries, development timeline, implementation of the HCV Wildlife Corridor, peatland protection measures, operational status of small-scale farmers, land disputes, and labor rights; concurrently assess the progress of addressing anonymous complaints.

- Evidence collection requirements: Take on-site photographs, retrieve original production

records, interview local communities and small farmers, and submit a formal SMETA-compliant on-site audit report as the primary basis for risk assessment.

- Closed-loop management: On-site inspections identify non-compliant issues such as deforestation, peat extraction, or illegal exploitation; a rectification plan with a deadline is issued. Failure to comply by the deadline results in inclusion on the 2024 supplier elimination list, followed by follow-up verification of corrective actions.

Risk assessment data should be sourced from diverse channels, including but not limited to supplier surveys, on-site audit reports, third-party certification data, satellite imagery, government land use records, and research reports from non-governmental organizations. The application of Geographic Information Systems (GIS) and remote sensing technologies in monitoring forest cover changes has become increasingly widespread; platforms such as Global Forest Watch provide near-real-time alerts about forest changes.

The risk assessment cycle should align with business operations and evolving risk dynamics. A comprehensive risk assessment is recommended at least annually, with increased frequency for high-risk suppliers or production regions. Additionally, an immediate response mechanism for major risk events should be established—for instance, enabling rapid assessment of potential impacts on the company's supply chain and prompt implementation of corrective measures when large-scale illegal logging is exposed in a specific region.

Risk Classification and Rating System

The risks associated with forest harvesting and conversion can be categorized as follows based on their origin and nature:

1. Direct deforestation risk: Refers to the direct clearance of virgin forests, protected forest areas, or high-carbon storage (HCS) zones resulting from oil palm cultivation. This represents the most severe category of risk, potentially leading to regulatory penalties, damage to brand reputation, and market access restrictions. Assessment criteria include: plantation development date (whether after December 31,2020), vegetation type prior to land conversion, and presence of protected area encroachment.

Supporting evaluation methods: primarily satellite remote sensing monitoring and field visits, supplemented by desk research and collection of supplier NDPE archives as preliminary screening evidence.

2. Indirect Land Use Change Risk (ILUC): Refers to indirect land use alterations resulting from oil palm cultivation, such as converting other agricultural lands to oil palm plantations and forcing the expansion of existing crop cultivation into forested areas. The ILUC criteria in the EU Renewable Energy Directive (RED II) specifically address this risk. Assessment indicators include regional patterns of land use change and trends in crop cultivation structure adjustments.

Supporting evaluation methods: analysis of regional land change data through desk research,

comparison of long-term satellite imagery, and collection of supplier production area planning archives.

3. Social compliance risks: These refer to land ownership conflicts, violations of indigenous rights, and labor rights issues associated with oil palm cultivation. Although not directly linked to deforestation, these social challenges are often intertwined with environmental degradation. Evaluation indicators include the legality of land acquisition procedures, implementation of Free Prior Informed Consent (FPIC), and working conditions.
Supporting evaluation methods: Collection of supplier compliance records, on-site visits and community interviews, and review of local land dispute public disclosure information.

4. Regulatory compliance risk: refers to legal consequences and commercial losses arising from non-compliance with domestic and international regulatory requirements. The EU's Zero Deforestation Act (EUDR) and national sustainable palm oil policies constitute the primary regulatory framework. Evaluation criteria include whether the product meets the sustainability requirements of target markets and the supplier's compliance record.
Supporting evaluation methods: regulatory comparison, collection of suppliers' NDPE IRF and certification documents, on-site verification of high-risk suppliers

Risk ratings may adopt a three-tier or five-tier system, based on a comprehensive assessment of the likelihood of risk occurrence and the severity of its impact. For example:

- High risk: There is clear evidence that the supplier is involved in virgin forest logging or peatland development; unable to provide credible traceability information; and has repeatedly violated environmental regulations.
- Moderate risk: Some plantations are located in secondary or degraded forest areas, but lack a clear sustainable management plan; the traceability system is inadequate but being improved.
- Low risk: The plantation is located on existing agricultural land with no history of forest conversion; it possesses a comprehensive traceability system and sustainable certification.

Key Evaluation Metrics

A risk-based evaluation indicator system should quantify the manifestations and severity levels of various risks. The following are the core evaluation indicators for the palm oil-derived fatty acid supply chain:

Table: Risk Assessment Indicators for Forest Deforestation in the Palm Oil Derivative Fatty Acid Supply Chain

Indicator Category	Specific Indicators	data sources	Risk Level Assessment Criteria	Corresponding Evaluation Method

History of Land Use	Plantation Development Time	Land ownership documents, satellite images	Developed as high-risk after December 2020	Supplier record collection, satellite monitoring, desk research
	Land Type Before Conversion	Historical satellite images, government records	Primary forests or peatlands are high-risk areas.	Satellite monitoring, desk research, field visits
	Distance to the protected area	GIS spatial analysis	The plantation within the buffer zone carries higher risks.	Satellite monitoring, GIS analysis, and desk research
Sustainable Practice	RSPO Certification Status	RSPO Certificate, Supply Chain Model	Not classified as high-risk; MB/SG is superior to B&C.	Suppliers' document collection, on-site visits, and desk research
	High Conservation Value (HCV) Assessment	HCV appraisal report	Unassessed or incompletely assessed constitutes a risk.	Collection of supplier documents; on-site visits for verification.
	Peatland Management Policies	Company policy documents, on-site audits	The absence of policies or poor policy implementation constitutes a risk.	Collection of supplier documents and on-site visits
Traceability and Transparency	Supply Chain Traceability	Supplier investigation and traceability system testing	Cannot be traced back to the plantation as high-risk	Suppliers' document collection, on-site visits, satellite monitoring
	Third-party Verification Ratio	Audit Report, Certification Data	An increase in the low verification ratio raises risks.	Suppliers' document collection and desk research
Business Compliance	Clarity of Land Ownership	Land ownership documents; community interviews	Property rights disputes are high-risk.	Collection of supplier records; on-site visits; community interviews.

	FPIC Implementation Status	Community Consultation Records	Failure to implement FPIC constitutes a high risk	Collection of supplier documents and on-site visits
	Protection of Labor Rights and Interests	Labor Policies; Findings from the Review	The presence of forced labor or child labor constitutes a high risk.	Collection of supplier documentation; on-site visits for verification.

The risk heatmap tool provides an intuitive visualization of risk distribution across different suppliers and production regions. By integrating the aforementioned evaluation results, a GIS-based risk heatmap can be generated to help procurement decision-makers quickly identify high-risk areas and optimize supplier portfolios. For instance, suppliers operating in Peru's Amazon region, where large-scale illegal deforestation has recently been reported, should be flagged as high-risk and require enhanced due diligence or consideration of alternative sources.

The dynamic nature of risk assessment cannot be overlooked. Risks within the palm oil supply chain continuously evolve due to policy changes, market fluctuations, and environmental conditions. For instance, Malaysia's and Indonesia's responses to the EU's Zero Deforestation Act, or the impact of climate anomalies on cultivation yields, can alter risk profiles in specific regions. Therefore, the risk assessment framework must possess sufficient flexibility to promptly incorporate new risk factors and updated information.

The Sustainable Palm Oil Roundtable Initiative (RSPO) certification system

The RSPO certification has become the industry-recognized primary standard for sustainable palm oil. This certification system comprises eight principles and 39 criteria, covering areas such as legal compliance, environmental protection, and community rights. As of 2022, RSPO-certified plantations covered 4.5 million hectares across 21 countries, protecting over 301,000 hectares of land. RSPO-certified palm oil reduces carbon emissions by approximately 35% compared to conventional palm oil.

The RSPO supply chain model offers four traceability options, ranked from most stringent to least stringent as follows: Identity Preserved (IP), Segregated (SG), Mass Balance (MB), and Book & Claim (B&C).

The promotion of RSPO in China faces unique challenges. As the world's second-largest palm oil importer, China's procurement share of sustainable palm oil reached only 8% in 2021, falling short of the 10% target set by RSPO. Major obstacles include low awareness among end consumers, the "hidden" presence of palm oil in product labels (often labeled as "vegetable oil" or chemical names), and insufficient purchasing incentives for companies. To address these challenges, RSPO China has adopted strategies such as leveraging multinational corporations to engage local suppliers, encouraging leading Chinese companies to join RSPO, and participating in policy-making processes.

Strategies for complying with the EU's new regulations warrant particular attention. As the

implementation of the EU Forestry Directive (EUDR) approaches, leading companies are enhancing their supply chain due diligence systems to demonstrate that their products do not involve deforestation occurring after December 2020. This includes collecting more detailed origin information, investing in traceability technologies, and collaborating with suppliers to address compliance challenges.

Risk Management and Improvement Recommendations

Based on comprehensive risk assessment and analysis of industry best practices, this section proposes targeted risk management strategies and improvement recommendations to help companies effectively mitigate deforestation and conversion risks in the palm oil-derived fatty acid supply chain. These recommendations cover multiple dimensions—including policy formulation, supplier management, traceability system development, and stakeholder engagement—forming a systematic risk management framework. Implementing these measures will not only enhance compliance and risk mitigation but also strengthen the company's sustainability profile and create long-term competitive advantages.

Develop a sustainable palm oil procurement policy

A clear written policy forms the foundation and public commitment for sustainable procurement. It is recommended that the company develop and publish a "Responsible Palm Oil Derivatives Procurement Policy," which should include the following elements:

1. Zero Forest Destruction Commitment: explicitly excludes palm oil raw materials derived from virgin forests, high-carbon storage (HCS) forests, areas of high conservation value (HCV), and peatlands, aligning with the EU's Zero Forest Destruction Act timeline by rejecting any forest-damaging raw materials produced after December 31,2020.
2. Certification Objective: Establish a clear timeline to progressively increase the RSPO certification rate, achieving 100% RSPO-certified supply by 2025, with at least 50% sourced from physical supply chains (MB/SG). This objective shall be regularly assessed and updated to reflect business developments and market changes.
3. Supplier Requirements: All suppliers of palm oil-derived fatty acids are required to comply with the company's sustainable procurement principles, provide complete supply chain traceability information, and cooperate with third-party audits. The policy shall clearly specify the consequences for non-compliance, including re-evaluation of business relationships.
4. Inclusion of Small Farmers: Commit to supporting the sustainable transition of small farmers by providing capacity building, technical assistance, or financing support to help them meet sustainability standards. This is key to addressing the integration challenges faced by small farmers and a priority issue for both the Malaysian and Indonesian governments.
5. Transparency and Reporting: Commit to regularly (at least annually) disclose progress in implementing procurement policies and objectives, including metrics such as RSPO certification

rates, traceability coverage, and supplier compliance status. Enhancing transparency is key to earning the trust of stakeholders.

Establish a comprehensive supply chain traceability system.

End-to-end traceability constitutes the fundamental technical basis for risk management. Given the unique complexity of the palm oil-derived fatty acid supply chain, the following measures are recommended:

1. Supply Chain Mapping: First, create a comprehensive supply chain map to identify all direct and indirect suppliers down to the plantation level. For steps that cannot be directly traced (e.g., blending processes in derivative production), require suppliers to provide quality balance records or transaction certificates.
2. Digital Traceability Platform: Invest in building or procuring a supply chain traceability management system to integrate data, certification information, and audit reports provided by suppliers. Consider adopting blockchain technology to enhance data integrity, particularly for high-risk regions and suppliers.

The platform is equipped with a satellite remote sensing monitoring integration module that automatically retrieves GIS forest map layers, enabling integrated online management for desk research and satellite monitoring data. High-risk suppliers are required to undergo annual on-site visits, combining online data verification with offline field inspections to establish a dual validation mechanism.

3. Geospatial validation: Utilize satellite imagery and GIS technology to verify plantation locations and historical land use patterns. Platforms such as Global Forest Watch provide forest change alerts, aiding in the identification of new deforestation activities.
4. Third-party audit: Conduct on-site audits of high-risk suppliers and production areas to verify the authenticity of the provided information. The audit should cover both environmental and social dimensions, with particular attention paid to sensitive issues such as land ownership, FPIC processes, and labor conditions.
5. Continuous Monitoring: Establish a sustained monitoring mechanism for the supply chain rather than conducting one-off assessments. Define Key Risk Indicators (KRI) and warning thresholds; initiate special investigations upon detecting anomalies (e.g., sudden alerts of significant forest loss in a specific production area).

The implementation of the traceability system should be carried out in phases, prioritizing high-risk products and suppliers. Initially, partial supply chains may not yet achieve full transparency; however, a clear timeline must be established to gradually expand traceability coverage. Concurrently, attention must be paid to data privacy and protection of trade secrets, striking a balance between transparency and appropriate confidentiality.

Supplier Capacity Building and Participation

Suppliers are key partners in risk management, not merely compliance subjects. Given that

approximately 30–40% of oil palm production in Malaysia and Indonesia comes from smallholder farmers, excluding them from the supply chain is neither practical nor equitable. The following engagement strategies are recommended:

1. Supplier Classification: Based on risk assessment results, suppliers are categorized into three levels—high, medium, and low risk—with differentiated management measures tailored to each level. High-risk suppliers require immediate corrective actions or replacement; medium-risk suppliers may be given an opportunity for improvement; low-risk suppliers can maintain a closer partnership.
2. Capacity-building projects: Provide training and technical support to suppliers (particularly smallholder farming collectives) who are willing to improve but lack the necessary capabilities, covering topics such as sustainable cultivation practices, record-keeping, and certification preparation. These projects can be implemented in collaboration with RSPO, industry associations, or other buyers, with costs shared among stakeholders.
3. Economic incentive mechanism: Provide price premiums or long-term procurement commitments for sustainable production raw materials to offset suppliers' certification and compliance costs. This "sustainability premium" serves as an effective tool to incentivize behavioral changes, particularly among small farmers.
4. Complaint and Correction Mechanism: Establish a formal complaint procedure; when non-compliance by suppliers is identified, provide them with an opportunity for correction rather than immediately terminating cooperation.
5. Collective Action Initiative: Participate in or initiate industry-wide collective action programs, such as the Sustainable Palm Oil Initiative (SPOA) or regional smallholder support programs. Collective actions enable cost sharing, resource pooling, and avoidance of duplication of efforts.

The key to supplier engagement lies in establishing long-term mutually beneficial relationships rather than merely exerting pressure. Through regular dialogue, joint problem-solving, and capacity building, sustainability requirements can be transformed into intrinsic motivation for suppliers, thereby achieving genuine behavioral change and continuous improvement.

Stakeholder participation and industry collaboration

Forest deforestation poses a systemic challenge that requires cross-sectoral and cross-value-chain collaboration. The company is advised to enhance external engagement in the following areas:

1. Join RSPO: Become a member of the Sustainable Palm Oil Roundtable Initiative and participate in standard-setting and industry dialogue. RSPO China has over 300 members, forming a localized knowledge network and collaboration platform.
2. Policy dialogue: Pay attention to and participate in the formulation process of relevant regulations, such as the implementation rules of the EU's Forest Protection Act and China's potential sustainable palm oil policies. Express industry concerns and feasible recommendations through industry associations or joint statements.
3. NGO and Academic Collaboration: Establish dialogue and cooperation channels with

environmental organizations such as the World Wildlife Fund (WWF) and Greenpeace, as well as research institutions. These organizations typically possess cutting-edge forest monitoring data and in-depth insights into production regions, which can complement the company's risk assessment.
4. Consumer Education: Although fatty acid derivatives are not directly marketed to consumers, they can support industry-wide consumer education efforts to enhance awareness of sustainable palm oil. The experience of RSPO China demonstrates that heightened consumer awareness can create a market-driven effect.
5. Investor Engagement: Incorporate progress on sustainable palm oil procurement into ESG reports and maintain regular communication with investors who prioritize environmental and social responsibility. A growing number of investors now consider forest conservation a key criterion in evaluating companies.

The essence of collaboration lies in defining clear objectives, contributing expertise, and measuring impact. Avoid "collaborating for the sake of collaboration," ensuring that each participation delivers tangible opportunities for risk reduction or improvement. Additionally, balance the expectations of various stakeholders and seek solutions acceptable to all parties involved.

Implementation Roadmap and Resource Allocation

Translating recommendations into concrete action plans requires a clear implementation roadmap and adequate resource support. The recommendations should be implemented in the following phases:

Table: Implementation Roadmap for Risk Management in the Palm Oil Derivative Fatty Acid Supply Chain

Time Frame	Key Action	Responsible Department	Success Indicator
2022-2023	1. Establish a cross-departmental working group 2. Develop a draft sustainable procurement policy 3. Conduct a preliminary supply chain risk assessment	The Procurement Department takes the lead, with participation from departments such as Sustainable Development and Legal Affairs.	The working group has been established; the policy draft is complete; high-risk suppliers have been identified.
2023-2024	1. Establish a desktop research database and standardize the supplier NDPE IRF collection templates	procurement department, IT department	Policy release; Supplier survey completion rate>80%; Satellite

Time Frame	Key Action	Responsible Department	Success Indicator
	2. Launching the satellite remote sensing GIS monitoring tool 3. Official Release of Procurement Policy 4. Conduct supplier surveys 5. Select and deploy a traceability system 6 Add to RSPO		monitoring system deployed, with the first round of preliminary risk screening conducted across all suppliers; System selection finalized; RSPO membership obtained.
2025	1. Conduct on-site audits (100%) for all high-risk suppliers. 2. Key Supplier Audit 3. Launch the Capacity Building Project 4. First Report on the Proportion of Sustainable Purchases 5. Establish an appeal mechanism	procurement department, sustainable development department	High-risk supplier audit coverage reached 100%; the routine satellite monitoring early warning mechanism operates stably; training programs have been launched; the first report has been released; and the relevant mechanism has been established.
2025-2030	1. Expand traceability coverage 2. Participate in industry collaboration initiatives 3. Evaluate policy effectiveness and make adjustments 4. Explore innovative solutions	Cross-departmental Team	Traced coverage across major product lines; participated in 1–2 industry

Time Frame	Key Action	Responsible Department	Success Indicator
			projects; completed policy revisions; launched innovation pilots.

Key findings of the risk assessment

The highly concentrated nature of supply chain risks emerges as the primary finding in the assessment. Eighty-three percent of global palm oil production is concentrated in Indonesia and Malaysia, both countries where oil palm cultivation has historically been linked to deforestation. According to World Bank data, Indonesia lost over 26.4 million hectares of virgin forest between 1990 and 2020, while its oil palm plantation area expanded from 1.1 million hectares to 16.38 million hectares during the same period. This geographical and industrial concentration allows risk management efforts to focus on a few key regions, but also increases the risk of regional events impacting the global supply chain.

The challenges faced by smallholder farmers pose unique complexities in risk management. In Indonesia, 41% and in Malaysia, 26% of oil palm cultivation areas are managed by smallholders, who often lack the resources and technical capacity to implement sustainable practices or meet increasingly stringent traceability requirements. The implementation of the EU's Forest Stewardship Council Directive may exclude these smallholders from supply chains, leading to livelihood issues and social backlash. Completely eliminating smallholder sources is neither practical nor equitable; supporting their transition to sustainable production has thus become a shared challenge for the industry.

The opacity of the derivatives supply chain complicates traceability. Compared to crude oil, palm oil-derived fatty acids typically undergo multiple processing and blending stages, making original cultivation information prone to loss throughout the supply chain. Given that companies are often geographically distant from the origins of palm oil and palm kernel oil, this lack of transparency necessitates risk assessment based on a combination of supplier declarations, certification systems, and sampling verification rather than comprehensive end-to-end traceability.

The rapid evolution of regulatory landscapes has given rise to new compliance requirements. The EU's Zero Deforestation Act will come into force on December 30,2024, requiring companies to demonstrate that their products do not involve deforestation occurring after December 31,2020. Meanwhile, countries such as Malaysia and Indonesia have filed complaints with the WTO, arguing that such regulations constitute trade barriers. This dynamic policy environment demands that corporate risk management systems possess sufficient flexibility and adaptability.

This risk assessment framework fully aligns with the phased management objectives outlined

in the Group's Palm Oil Sustainable Procurement Strategy Timeline (2022−2030): completing baseline supply chain mapping by 2022; achieving phased traceability and RSPO quantifiable targets, reducing high-risk issues by 50%, and preliminarily meeting NDPE compliance requirements by 2025; achieving zero deforestation, zero peat development, and zero exploitation across the entire supply chain by 2030. The report employs four tiered assessment methods—including desk research, collection of NDPE IRF documentation, satellite remote sensing, and field visits—selected based on supply chain location and regional risk profiles, thereby fully complying with the detailed methodological requirements specified by both NDPE and SPI evaluations.

Value Proposition of Risk Management Strategies

Proactive risk management creates multiple benefits for companies that far exceed mere compliance and risk mitigation.

1. Business continuity assurance: By ensuring that the supply chain complies with regulatory requirements of major markets (e.g., EUDR), risks of commercial disruptions such as product rejection, fines, or confiscation can be avoided. As an increasing number of countries and regions introduce similar regulations, proactive deployment of a sustainable supply chain has become a prerequisite for market access.
2. Enhanced brand reputation: In an era of growing environmental awareness, responsible procurement practices can strengthen brand credibility and establish a differentiated market position. Conversely, as demonstrated by the EIA report, supply chains linked to deforestation may trigger consumer resistance and criticism from NGOs.
3. Cost and supply stability: Although sustainable palm oil may incur short-term cost increases, it helps stabilize supply relationships in the long run and reduces supply chain disruptions caused by environmental controversies or regulatory changes.
4. Innovation and collaboration opportunities: Participation in sustainable palm oil initiatives (such as RSPO) provides access to industry networks, knowledge sharing, and joint innovation opportunities. These intangible assets can be translated into new products, new markets, or improved efficiency.
5. Investor appeal: A growing number of investors are incorporating environmental and social governance (ESG) factors into their decision-making processes. Robust sustainable supply chain management can enhance ESG ratings and attract the favor of more responsible investors.

The path to value realization lies in integrating risk management into core business decisions, rather than treating it as an additional compliance burden. Procurement decisions should comprehensively consider price, quality, and sustainability performance; establish long-term partnerships with strategic suppliers based on shared values; and progressively extend sustainability requirements across the entire supply chain.

Act Now (2025 Update: Steps 1–4 completed)

1. Establish a cross-functional team: Led by the procurement department, collaborate with sustainability, legal, R&D, and other departments to form a Sustainable Palm Oil Working Group responsible for strategy development and implementation oversight. Clearly define each member's responsibilities and key performance indicators.

2. Develop and issue procurement policies: Draft the "Responsible Palm Oil Derivatives Procurement Policy," which includes key elements such as zero deforestation commitments, certification targets, and supplier expectations. The policy development process should involve consultations with key suppliers and internal stakeholders.

3. Conduct supplier risk assessment: Perform preliminary risk screening of existing suppliers of palm oil-derived fatty acids, with particular attention to the following aspects: origin of raw materials (whether sourced from high-risk regions in Indonesia/Malaysia), certification status, and traceability capabilities. Based on the risk assessment results, classify suppliers and develop differentiated management strategies.

4. Join RSPO: Apply to become a member of the Sustainable Palm Oil Roundtable Initiative, participate in relevant training sessions and events, and learn about industry best practices. RSPO China already has over 300 members, forming a localized knowledge network.

5. Investment Traceability System: Evaluate and select supply chain traceability solutions tailored to the company's scale and needs, including blockchain platforms, GIS tools, or specialized supply chain management software. Initially prioritize high-risk products and suppliers, then gradually expand coverage.

6. Initiate supplier communication: Communicate the company's sustainable procurement policy to existing suppliers, explain expectations and requirements, and assess their readiness and challenges. This dialogue helps identify practical obstacles and opportunities for collaborative improvement.

Long-term Improvement Direction

1. Enhance certification rates and quality: Gradually transition from the RSPO Bookkeeping Credit (B&C) model to Quality Balance (MB) and Segregation (SG) models to improve supply chain traceability and transparency. Establish annually increasing certification rate targets and publicly report progress.

2. Support the transformation of small farmers: Provide supporting services including NDPE IRF record filing, satellite-based plot management, and specialized training on sustainable farming

practices, steadily increasing the certification rate for small farmers to 50% by 2030; simultaneously incorporate initiatives such as regional peatland rehydration and community income diversification projects; ensure that by 2030,80% of communities surrounding supply chains participate in or initiate small farmer capacity-building programs aimed at improving livelihoods, helping them meet sustainability standards and obtain certifications. This will not only expand the supply of sustainable raw materials but also contribute to community development and supply chain resilience.

3. Explore innovative solutions: Evaluate the feasibility of palm oil alternatives, such as the 59 non-food biodiesel plants studied in China's Hainan Province, or invest in technological innovations to improve palm oil utilization efficiency. In the long term, raw material diversification can reduce supply chain risks.

4. Strengthen industry leadership: Play a leading role within the sector by sharing best practices, participating in standard-setting, and advocating for policy reforms. The systemic transformation of sustainable palm oil requires the demonstration and promotion by pioneering enterprises.

6. Integrate the concept of circular economy: Explore value-added utilization of palm oil by-products or waste oil recycling projects to enhance resource efficiency. For example, anaerobic fermentation of sludge to produce volatile fatty acids may provide an additional raw material source.
7. Ecological Restoration and Long-Term Climate & Water Resource Management: Complete the restoration of 10,000 hectares of degraded HCV/HCS forest land as planned; establish wildlife protection corridors throughout all cooperative plantations; achieve SBTi scientific carbon reduction targets by promoting integrated low-carbon agriculture-forestry practices to reduce fertilizer and water consumption; submit annual environmental data reports to CDP and the WEF Tropical Forest Alliance, regularly disclosing progress in forest restoration, carbon mitigation, and water resource management.