

责任管治 / CSR Management

(一) 责任战略 / Strategy for Responsibility

在创造经济价值的同时，华润水泥十分重视并积极参与社会责任实践，将企业社会责任融入安全、环境、员工、客户、合作伙伴和社区中，持续夯实厂区安全管理，提升环保管理水平，优化节能减排改造措施，实施健康管理，推广协同处置项目，以创新的精神、务实的态度不断推动中国水泥行业的转型升级。

2017年华润水泥社会责任报告以“经济责任、客户责任、员工责任、伙伴责任、公共责任、环境责任”为维度，以“润心为您 丰业为家”为主题，通过展示华润水泥对利益相关方的社会责任实践，详实披露了企业履责情况。

While creating economic value, CR Cement places strong emphasis on and actively puts into practice social responsibility by integrating corporate social responsibility with safety, environment, employees, customers, business partners and communities. We continue to consolidate safety management for production plants, improve levels of environmental protection management, and optimise transformational measures for energy saving and emission reduction. We also implement health management and promote waste co-processing projects, thereby accelerating the transformation and upgrade of the cement industry in China with an innovative spirit and a pragmatic approach.

Themed with "our values for you, our harvest for all", the Social Responsibility Report of CR Cement ("CSR Report") in 2017 makes a detailed and authentic disclosure of our practice in fulfilling corporate social responsibility to our stakeholders in terms of "responsibilities to economy, customers, employees, business partners, public and environment".

“润心为您”——秉持诚实守信的核心理念，以脚踏实地、坚韧不拔的精神，用一流的产品和服务，为社会大众创造高品质的生活空间，铸造美好生活。

"Our Values For You" - Upholding the core values of honesty and trust, with grounded and indomitable spirit, we use first-class products and services to create for the people a high quality living environment and the foundations for a beautiful life.

“丰业为家”——坚持创新驱动的核心能力，引领行业变革，推动社会环境的可持续健康发展。

"Our Harvest For All"- Adhering to innovation-driven core competencies, leading industry-wide transformation and promoting sustainable and healthy societal development.

使命 / Mission	<p>为客户提供优质产品及服务，推动行业创新，引领绿色发展，实现基业长青。</p> <p>To provide customers with quality products and services, promote innovation and lead green development in the industry, thereby to build an everlasting business.</p>
愿景 / Vision	<p>成为受人尊重的世界一流水泥企业。</p> <p>To become a respected world-class cement company.</p>

(二) 责任治理 / Governance of Responsibility

· 完善社会责任管理制度 / Improving the system of social responsibility management

1. 组织体系 / Organization

华润水泥坚持履行企业社会责任，为进一步加强公司企业文化与社会责任工作，提升企业形象，推动相关工作有序开展，成立了“华润水泥企业文化与社会责任指导委员会”以及“华润水泥社会责任报告编制委员会”，负责对公司社会责任战略方向进行决策、领导和推进，并编制年度社会责任报告。

CR Cement strives to fulfill its corporate social responsibility. In order to further reinforce our corporate culture and social responsibility work, enhance our corporate image and promote relevant work in an orderly manner, we established "the CR Cement Corporate Culture and Social Responsibility Steering Committee" and "the CR Cement CSR Report Preparation Committee". The committees are responsible for decision-making, leadership and promotion of the Company's strategic direction in corporate social responsibility, as well as annual preparation of the CSR Report.

2. 制度体系 / System

依据香港联交所上市规则附录二十七《环境、社会及管治报告指引》(HK-ESG)、中国社会科学院《中国企业社会责任报告编写指南(CASS-CSR4.0)》等标准、以及《华润集团社会责任工作管理办法》的要求,启动对公司《社会责任工作管理办法》的梳理和修编,确保公司社会责任工作的规范化、体系化。

To ensure standardization and systemization of corporate social responsibility work, the Company reviewed and revised the "Social Responsibility Management Approach" with reference to the "Environmental, Social and Governance Reporting Guide" (HK-ESG) of Appendix 27 of the Listing Rules of HK Stock Exchange, the "Chinese CSR Report Preparation Guide" (CASS-CSR4.0) issued by the Chinese Academy of Social Sciences and the "Social Responsibility Management Approach for China Resources Group".

3. 报告编写体系 / Report preparation

华润水泥连续五年编制社会责任工作报告,公司各级单位均设相应工作联络人,形成由控股总裁办牵头、各级单位共同参与的报告编写体系。

CR Cement has prepared the CSR Reports for five consecutive years. The CEO's Office co-ordinates various departments of all levels with relevant contact persons to involve in preparing CSR Report.

4. 责任融合 / Responsibility integration

公司将公司治理、经营效益、安全生产、节能减排、转型创新、协同处置、关爱员工、公益慈善等社会责任工作融入公司发展战略。

Our development strategy has been integrated with social responsibility including corporate governance, operational efficiency, production safety, energy saving and emission reduction, transformation and innovation, waste co-processing, care for employees, community work and charity.

· 加强社会责任宣导教育 / Reinforcement of advocacy and education of social responsibility

华润水泥举办了2017年社会责任报告编制培训,普及社会责任报告编制知识,进一步提升公司内部社会责任管理意识。培训过程中,社会责任领域专家从社会责任基础理论及实务,联交所对环境、社会及管治报告的披露要求,行业相关案例分享,社会责任报告指标统计方法等方面进行了分享。来自华润水泥各部室、各大区的社会责任报告编制人员参与了培训,并分享了责任故事及社会责任工作心得体会。

CR Cement held training sessions for preparing the 2017 CSR Report, in order to disseminate the knowledge of CSR Report preparation and further reinforce the awareness of social responsibility management within the Company. During the training, experts in social responsibility shared fundamental theories and practice of social responsibility, the disclosure requirements of HK Stock Exchange on environmental, social and governance report, case



studies of the cement industry and the statistical methods for CSR reporting indicators. Staff from various departments and major regions of CR Cement, who involved in preparation of the CSR Report, participated in the training and shared responsibility stories and their experience in social responsibility work.

· 参与社会责任行业标准制定 / Participation in the formulation of industrial standards of social responsibility

作为“中国水泥协会团体标准”《水泥企业社会责任准则》《水泥企业社会责任报告编写指南》《水泥企业社会责任评价指标体系》的主要起草单位，华润水泥与中国水泥协会、北京东方君和管理顾问有限公司、尧柏特种水泥集团有限公司共同开展课题研究，编制团体标准，为建立行业社会责任践行标准献计献策。

As the main drafting unit of the "Group Standards for China Cement Association", namely, "Standards of Cement Corporate Social Responsibility", "Guidelines on Preparation of Cement Corporate Social Responsibility Report" and "System of Evaluation Indicators for Cement Corporate Social Responsibility", CR Cement jointly carried out project research and prepared group standards with China Cement Association, Beijing Dongfang Junhe Management Consultant Co., Ltd. and Yaobai Special Cement Group Co, Ltd. in order to contribute plans and strategies for the establishment of industry practice standards in social responsibility.

(三) 责任沟通 / Communication of Responsibility

· 重大性议题识别 / Identification of major issues

公司通过多种渠道积极获取各利益相关方意见，了解他们对华润水泥可持续发展工作的看法，并以此作为我们此次报告信息披露与未来可持续发展战略决策的重要参考。

为此公司通过问卷调查、面对面沟通、电话访谈、现场调研等多种形式与各利益相关方群体进行全面沟通。通过 952 份问卷调查、2 家基地现场调研及 14 个部门 26 名人员访谈，充分了解了公司管理层以及各利益相关方的需求与期望，并根据对问卷调查数据的分析结果，绘制出华润水泥可持续发展议题重大性分析矩阵，为华润水泥 2017 年度社会责任报告选取 36 个最受利益相关方关注的重大性议题进行披露。

The Company actively solicited opinions from various stakeholder groups through various channels in order to understand their views on the sustainable development of CR Cement, which in turn have become important references for the information disclosure in this report and our strategic decisions in future sustainable development.

For this purpose, we have engaged a professional third-party agency to communicate comprehensively with various stakeholder groups through questionnaires, face-to-face communications, telephone interviews and on-site research. Through 952 questionnaires, on-site research in two production plants and interviews with 26 staff from 14 departments, the needs and expectations of our management and various stakeholders have been fully understood. According to the analysis results of the questionnaire data, the top 36 issues of our stakeholders' concern have been disclosed in the 2017 CSR Report in the form of an analysis matrix portraying the materiality of sustainable development issues of CR Cement.



952 份问卷调查

2 家基地现场调研

14 个部门

26 名人员访谈

952 questionnaires,
On-site research in

2 production plants
Interviews with

26 staff from 14
departments

华润水泥可持续发展议题重大分析

Analysis on the materiality of issues on sustainable development of CR Cement



序号 No.	责任领域 Areas of responsibility	议题 Issues	重要性排序 Importance
1	环境责任 Responsibilities to Environment	严格管理污染物 (确保排放物达到国家环境标准, 并且不断降低对环境的影响) Strict management of pollutants (ensure that emissions of pollutants meet the national environmental standards, and impacts on the environment are continuously reduced)	高 High
2	公共责任 Responsibilities to Public	落实安全生产责任制 (避免安全事故发生, 保障内部员工以及外部供应商等安全) Implementing production safety accountability system (prevent the occurrence of accidents, and ensure the safety of internal employees and external suppliers)	高 High

序号 No.	责任领域 Areas of responsibility	议题 Issues	重要性排序 Importance
3	环境责任 Responsibilities to Environment	制定并执行环境管理体系 (如环境管理体系、环境管理战略、环保预警及应急机制) Formulating and implementing environmental management systems (for example, environmental management systems, environmental management strategies, environmental protection precaution alerts and contingency mechanisms)	高 High
4	员工责任 Responsibilities to Employees	重视员工诚信建设和廉洁工作 Keen attention to integrity education for employees	高 High
5	环境责任 Responsibilities to Environment	加大节能环保投入 (如环保技术投资、减排技术改造、研发与创新) Increasing investment in energy saving and environmental protection (for example, investment in environmental protection technology, technological transformation in emission reduction, R&D and innovation)	高 High
6	客户责任 Responsibilities to Customers	强化产品质量管理 (建立质量管理体系、标准, 强化日常监管评估) Enhancing product quality management (establish quality management systems and standards while enhancing daily control assessments)	高 High
7	员工责任 Responsibilities to Employees	关注员工健康 (预防职业病) Care for the health of employees (prevent occupational diseases)	高 High
8	伙伴责任 Responsibilities to Business Partners	规范采购 (加强供应商合规管理, 定期审查, 建立反腐败政策) Regulating procurement (strengthen supplier compliance management, conduct regular reviews, and formulate anti-corruption policies)	中 Moderate
9	环境责任 Responsibilities to Environment	降低能源消耗 (应用清洁能源) Reducing energy consumption (use clean energy)	中 Moderate
10	环境责任 Responsibilities to Environment	节约水资源 (提高水的循环利用, 降低水消耗, 规范污水排放) Water resources conservation (improve water recycling, reduce water consumption, and regulate sewage discharge)	中 Moderate

序号 No.	责任领域 Areas of responsibility	议题 Issues	重要性排序 Importance
11	经济责任 Economic Responsibilities	提升公司管理效益 (如业务创新、结构优化) Improving corporate management efficiency (for example, business innovation and structure optimization)	中 Moderate
12	员工责任 Responsibilities to Employees	合规用工 (确保合理工作时长、杜绝强制劳工、提供平等无歧视的工作环境等) Employment compliance (ensure reasonable working hours, eliminate forced labour, and provide an equal and discrimination-free workplace)	中 Moderate
13	经济责任 Economic Responsibilities	创造经济价值 (扩展市场份额) Creating economic value (expand market share)	中 Moderate
14	员工责任 Responsibilities to Employees	保护员工权益 (完善工会职能, 为员工提供权益保障及民主管理制度等) Protecting rights and interests of employees (improve the functions of labour unions, provide employees with protection of their rights and interests as well as a democratic management system)	中 Moderate
15	员工责任 Responsibilities to Employees	关注员工职业发展 (为员工提供培训, 打造员工晋升通道, 跟进员工满意度调查) Care for career development of employees (provide training for employees, build a path of career progression for employees, and follow up on employee satisfaction surveys)	中 Moderate
16	环境责任 Responsibilities to Environment	保护生态 (实施矿山复绿以及生物多样性保持等工作) Ecology protection (implement ecological restoration of mines and biodiversity protection)	中 Moderate
17	公共责任 Responsibilities to Public	开展安全生产专项活动 (如风险识别、风险意识宣传以及演练等) Launching special campaigns for production safety (for example, risk identification, promotion of risk awareness and drills)	中 Moderate
18	客户责任 Responsibilities to Customers	产品创新 (以客户需求角度出发研发创新产品) Product innovation (continuous R&D of innovative products in anticipation of customers' needs)	中 Moderate

序号 No.	责任领域 Areas of responsibility	议题 Issues	重要性排序 Importance
19	环境责任 Responsibilities to the Environment	助力环境改善 (协同处置外部产生的固体废弃物) Facilitating environmental improvement (co-process solid waste generated externally)	中 Moderate
20	客户责任 Responsibilities to Customers	保护客户权益 (公平交易, 保护客户信息与隐私) Protecting rights and interests of customers (fair trade, protect customers' data and privacy)	中 Moderate
21	经济责任 Economic Responsibilities	保护股东及投资者权益 (规范大股东行为, 建立投资者沟通机制, 规范信息披露) Protecting rights and interests of shareholders and investors (regulate the behaviours of major shareholders, build a communication mechanism for investors, and regulate information disclosure)	中 Moderate
22	客户责任 Responsibilities to Customers	完善客户服务 (提供投诉渠道, 进行有效反馈, 回收存在质量问题的产品) Improving customer service (provide complaint channels and effective feedback, and recall products with quality issues)	中 Moderate
23	员工责任 Responsibilities to Employees	关爱员工 (帮扶困难员工、开展丰富的员工活动等) Care for employees (help the employees in need, and organize a wide variety of activities for employee)	中 Moderate
24	经济责任 Economic Responsibilities	建立良好企业管治规范 (持续检讨董事局及其辖下各委员会情况) Establishing good corporate governance practices (continuously review the conduct of the Board and its committees)	中 Moderate
25	客户责任 Responsibilities to Customers	知识产权管理 (完善管理、保护自身知识产权, 同时不侵犯他人知识产权) Intellectual property management (improve management and protection of our intellectual property rights without infringing the others')	中 Moderate
26	环境责任 Responsibilities to Environment	应对气候变化 (管控及减少温室气体排放, 应用可再生能源) Addressing climate change (manage, control and reduce greenhouse gas emissions, and use renewable energy)	中 Moderate

序号 No.	责任领域 Areas of responsibility	议题 Issues	重要性排序 Importance
27	环境责任 Responsibilities to Environment	支持环境公益 (举办环保培训, 进行宣传教育, 组织参与环保行动) Support on environmental community work (organize environmental trainings, promotions and education, and participate in environmental protection activities)	中 Moderate
28	客户责任 Responsibilities to Customers	提供多元化产品 (拓宽产品应用范围) Providing diversified products (broaden the scope of product application)	中 Moderate
29	环境责任 Responsibilities to Environment	优化包装材料使用 (如减少水泥包装材料或使用再生包装材料) Optimizing the usage of packaging materials (for example, reduce packaging materials for cement in bags, or use recyclable packaging materials)	中 Moderate
30	环境责任 Responsibilities to Environment	践行绿色办公 (提倡使用环保纸、双面打印, 无纸化网络办公, 节电节水等) Green office in practice (promote the use of environmentally friendly paper, double-sided printing, paperless and Internet office, and conservation of electricity and water)	中 Moderate
31	伙伴责任 Responsibilities to Business Partners	绿色采购 (采购过程考虑供应商的环境合规) Green procurement (take supplier's environmental compliance into consideration in our procurement process)	中 Moderate
32	伙伴责任 Responsibilities to Business Partners	促进行业发展 (加强同行交流、参与行业组织) Promoting industry development (enhance experience sharing within the industry, and participate in industry organizations)	中 Moderate
33	伙伴责任 Responsibilities to Business Partners	采购考虑供应商安全管理 (如安全生产的表现等) Taking suppliers' safety management into consideration in our procurement process (for example, performance in production safety)	中 Moderate

序号 No.	责任领域 Areas of responsibility	议题 Issues	重要性排序 Importance
34	伙伴责任 Responsibilities to Business Partners	本地化采购 (使用本地供应商, 提高社区经济效益并减少运输成本) Local procurement (engage local suppliers, increase economic benefits to local communities, and reduce transportation costs)	低 Low
35	公共责任 Responsibilities to Public	公益捐赠 (资金或者物资(水泥产品等)支持需要地区/群体) Charitable donations (support regions/groups in need with funds or supplies such as cement products etc.)	低 Low
36	公共责任 Responsibilities to Public	社区服务 (关注社区弱势群体、志愿者参与等) Community service (care for the underprivileged in the community, and participate in volunteer work)	低 Low

通过整合 36 个最受利益相关方关注的重大性议题, 我们发现利益相关方高度重视议题主要集中为环境责任、公共责任及员工责任。

By consolidating the top 36 issues of our stakeholders' concern, we found that our stakeholders mainly concerned the issues of our responsibilities to environment, public and our employees.

· 加强责任沟通 / **Strengthening accountable communications**

作为香港上市公司, 华润水泥一贯重视与利益相关方的沟通, 听取各方意见、关注事项和期望, 积极改善企业经营和管理。通过信息报送、专题汇报、股东会议、参观考察、公益活动、员工集体活动、公司网站等方式, 严谨、及时、准确地提供公司业绩、重要活动等方面的信息, 促进彼此沟通了解、达成共识。

We attach great importance to stakeholder communication as a listed company in Hong Kong. We proactively strive to improve our corporate operation and management by listening to the opinions, concerns and expectations of our stakeholders. Through information reporting, special reports, shareholders' meetings, visits, charity events for the community, employees' group activities and company website, the Company discloses its information including performance results and significant events in a rigorous, timely and accurate manner for facilitating communications, mutual understanding for consensus.

利益相关方类别 Categories of stakeholders	诉求与期望 Aspirations and expectations	沟通与回应 Communications and responses
政府及监管机构 Government and regulatory bodies	<ul style="list-style-type: none"> · 守法合规经营 · 支持地区发展 · 贯彻国家政策 · Legal and compliant operations · Supporting regional development · Implementing national policies 	<ul style="list-style-type: none"> · 持续强化企业合规管理 · 参与政府相关会议及合作 · 响应相关国家政策 · Continuously strengthening corporate compliance management · Participating in relevant meetings and co-operation with the government · Responding to relevant national policies
股东 Shareholders	<ul style="list-style-type: none"> · 创造经济价值 · 加强信息披露 · Creating economic value · Strengthening information disclosure 	<ul style="list-style-type: none"> · 持续提升经营业绩 · 提升公司管治及风险管理水平 · 定期发布报告，及时披露信息 · 召开股东大会，加强投资者关系管理 · Continuously improving operating results · Raising the standards of corporate governance and risk management · Regularly publishing reports, and disclosing information in a timely manner · Convening shareholders' meetings to strengthen investor relations management
客户或产品使用者 Customers or product users	<ul style="list-style-type: none"> · 产品服务质量 · 保护合法权益 · Quality of products and services · Protecting legal rights and interests 	<ul style="list-style-type: none"> · 建立健全客户服务体系 · 完善客户意见反馈及投诉处理机制 · Establishing and improving customer service system · Perfecting the mechanism for customer feedback and complaint handling
员工 Employees	<ul style="list-style-type: none"> · 保障员工权益 · 促进员工发展 · 关爱员工健康 · 聆听员工意见 · Protecting rights and interests of employees · Promoting staff development · Care for employees' health · Listening to employees' opinions 	<ul style="list-style-type: none"> · 制定有竞争力的薪酬体系和福利保障机制 · 组织员工培训，完善晋升机制，搭建发展平台 · 改善工作条件，关爱困难员工 · 开展员工活动，加强员工沟通 · Formulating competitive compensation system and welfare protection mechanism · Organizing staff training, perfecting promotion mechanism, and building development platform · Improving working conditions, and caring for employees in need · Launching staff activities, and strengthening communications with staff

利益相关方类别 Categories of stakeholders	诉求与期望 Aspirations and expectations	沟通与回应 Communications and responses
供应商及合作伙伴 Suppliers and business partners	<ul style="list-style-type: none"> · 促进行业发展 · 合作互利共赢 · Promoting industry development · Win-win co-operation for mutual gains 	<ul style="list-style-type: none"> · 实施阳光采购，打造责任供应链 · 参与行业组织，推动水泥行业可持续发展 · Implementing sunshine procurement, and creating an accountable supply chain · Participating in industry organizations to promote sustainable development of cement industry
科研院所、行业组织、媒体与社会团体 Research institutes, industry organizations, media and social groups	<ul style="list-style-type: none"> · 遵守行业规范 · 推进行业创新 · 信息透明公开 · Compliance with industry standards and regulations · Promoting innovation in the industry · Transparency and openness of information 	<ul style="list-style-type: none"> · 加强对外交流与合作，参与产业创新研究 · 参与行业评优，对行业规范提出建议 · 完善信息披露制度，优化舆情反馈机制 · Strengthening external exchanges and co-operation, and participating in innovation and research of the industry · Participating in industry appraisal, and making recommendations on industry standards and regulations · Improving the information disclosure system, and optimizing the feedback mechanism for public opinions
社区 Community	<ul style="list-style-type: none"> · 支持社区公益 · 提供就业机会 · Supporting community charity · Providing employment opportunity 	<ul style="list-style-type: none"> · 积极参与慈善捐赠，投身社会公益活动 · 校园招聘与社会招聘 · Actively participating in charitable donations, and being devoted to charity events for the community · Campus recruitment and public recruitment
环境 Environment	<ul style="list-style-type: none"> · 合理利用资源 · 保护生态环境 · Reasonable use of resources · Protecting the ecological environment 	<ul style="list-style-type: none"> · 提高能源和资源使用效率，落实节能减排 · 加强环境数据披露，管理并降低环境风险 · Improving efficiency of energy and resources usage, and implementing energy saving and emission reduction · Strengthening disclosure of environmental data, managing and reducing environmental risks

（四）责任故事 / CSR Stories

责任故事一：为港珠澳大桥提供定制化产品及服务

CSR Story I: Customizing products and services for Hong Kong-Zhuhai-Macao Bridge

2009年12月15日，全长55公里，连接香港、珠海、澳门的超大型跨海通道－港珠澳大桥正式开工建设。

2012年，大桥进入海底沉管施工阶段。然而，它处在一个洋流、航道、海床、气候等自然条件极其复杂、需重度防腐的海域，这种高温高湿多盐的海洋环境，对混凝土的抗海水渗透性、耐腐蚀性等方面有着极高的要求；且大体积大数量混凝土模块必须一次浇筑成型，对水泥质量的要求也达到了近乎苛刻的程度，中国在这一建设领域的空白亟待打破。

岛隧施工单位试图通过邀请招标，让行业翘楚集思广益，扩大供应产品择取范围，攻克这一难关。这一消息引起了中铁物资集团和华润水泥的关注。

通过沟通，双方决定共同合作攻克难关，调集科研人员，迅速进入紧锣密鼓的研发攻坚阶段。针对招标文件对于产品质量的特殊要求，专门选矿，专库专磨，专线试产，并在华润水泥华南地区的各大基地逐一进行烧制。经过反复试验生产，最终在华润水泥（平南）有限公司取得成功，产出的水泥不仅能够达到设计要求，很多关键指标更已超出同类产品。施工单位通过配比核实验得出最后结论，新研发产品质量符合要求、技术稳定可控，一定程度上甚至超过此前认可产品。

为保证大桥120年使用寿命要求，华润水泥开辟独立生产线进行专产专供，整个生产运输流程按照国际质量体系进行严格管理。最终，通过稳定过硬的产品质量和定向专供的生产设计，以及从中展现出的央企担当和责任意识，华润水泥在此次邀请招标中脱颖而出，成功入围。在大桥珠海段的主体工程建设中，主要选用了华润水泥出品的“润丰”牌P. II 42.5R、P.O 42.5(R)、P. II 52.5(R)等级的高性能硅酸盐水泥。

华润水泥还根据工程要求，对港珠澳大桥不同部位如岛隧工程、沉管预制件、桩基桩等部位混凝土采取定制化的生产控制流程和原料质量监控，采用最新工艺和配比，设计出满足供应项目特定要求的高性能海工水泥；同时，对施工质量进行严格控制、加强后期养护，最大限度地提高混凝土的密实性，使混凝土构件的性能得到大幅提升，确保满足工程建造的要求。

2017年，华润水泥仍持续向港珠澳大桥建设提供优质产品及服务。

On 15 December 2009, construction work officially commenced for the mega cross-harbour tunnel, Hong Kong-Zhuhai-Macao Bridge with a total length of 55 km, which connects Hong Kong, Zhuhai and Macau.

In 2012, the construction progressed to immersed tunnel building in deep seawater. However, due to the extremely complicated natural conditions of the maritime site such as ocean currents, waterways, seabed and climate, the construction in such a hot humid and hypersaline marine environment stringently required anti-seawater permeability and corrosion resistance for the concrete. Besides, casting and molding of concrete blocks in huge volume and large quantity had to be completed in the first attempt, which also imposed nearly harsh requirements on the quality of cement. It was imperative for China to break through in this aspect.

In order to overcome such difficulties, the construction contractor of the island tunnel attempted to invite the top players in the industry for their ideas through tender and to expand the range of products supplied. This had attracted the attention of China



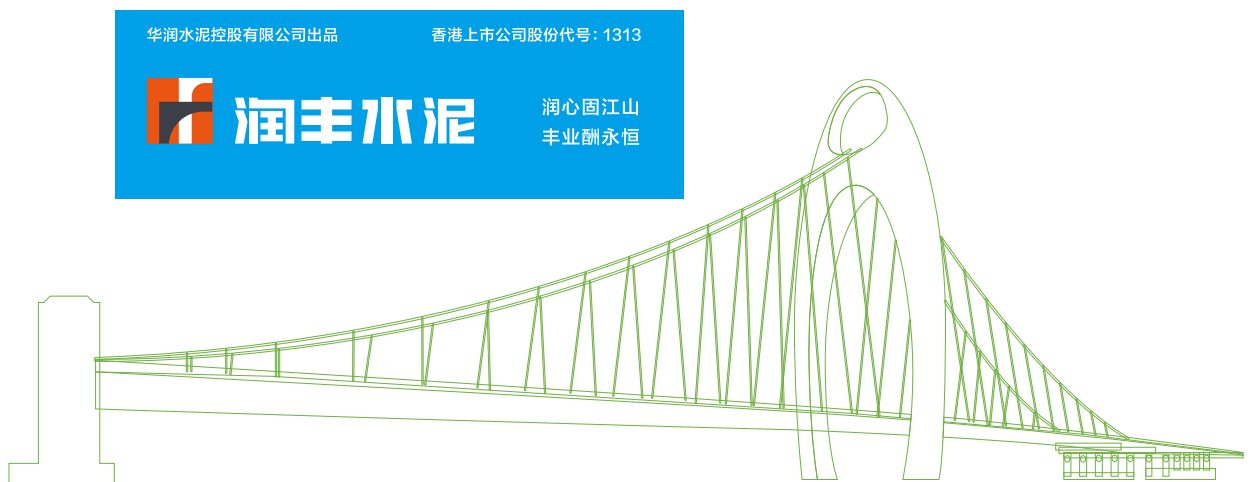
Railway Material Group and CR Cement.

After communications, both parties agreed to co-operate in overcoming such difficulties. They mobilized scientific research staff for swift and intensive R&D. To meet the special requirements for product quality in the tender documents, special raw materials from dedicated mines were stored in dedicated silos, processed in dedicated grinders, and used for trial production in dedicated cement production lines of every major production plant of CR Cement in Southern China. After repeated trials of production, China Resources Cement (Pingnan) Limited successfully produced cements not only with all the design requirements but also exceeding similar products in terms of various key indicators. After examining the production formula, the construction contractor reached the final conclusion that the quality of the newly-developed product had met their requirements, with a stable and controllable technology, which had surpassed the previously accredited products to a certain extent.

In order to guarantee a useful life of 120 years for the Bridge, we have designated independent cement production lines for exclusive production and exclusive supply, where the entire processes from production to transportation were strictly managed according to the international quality system. CR Cement finally distinguished itself from others in the tendering and was successfully selected thanks to its stable product quality and tailored production design with exclusive supply. Portland cement of high performance and P.II 42.5R, PO 42.5(R) and P.II 52.5(R) grades under the "Runfeng" brand of CR Cement was mainly used in building the Zhuhai section of the Bridge.

In accordance with the project requirements, CR Cement also adopted customized production control procedures and monitor on the quality of raw materials for different parts of the Hong Kong-Zhuhai-Macao Bridge, such as the island tunnel project, prefabricated parts for immersed tube and concrete for pile foundation. It also adopted the latest technology and prescriptions, thus designing the high-performance marine cement that met the specific requirements of the supply project. At the same time, it strictly controlled construction quality and strengthened repairs and maintenance in the later stage to maximize the compactness of the concrete, significantly improving the performance of concrete components and ensuring fulfillment of the requirements of construction.

In 2017, CR Cement continued to provide quality products and services for the construction of the Hong Kong-Zhuhai-Macao Bridge.



责任故事二 矿山复绿

CSR Story II:
Ecological restoration of mines





华润水泥（龙岩）有限公司冬瓜仑矿山排土场占地约 56.7 万平方米，受土质沙化、保水能力差等因素影响，存在水土流失等风险隐患。为修复山体、消除隐患、绿化环境、恢复生态，建设绿色矿山，龙岩水泥与绿化公司、当地林业部门充分沟通，在土壤性质化验和鉴定的基础上，设计造林方案，选种木荷、香樟树种，组织员工开展复绿植树活动。截至 2017 年底，共种植树苗 10 万多株，实现排土场绿化覆盖率 90%，以实际行动践行企业社会责任，构建、维护和谐村企关系，努力打造绿色企业。

The Donggualun mine dump of China Resources Cement (Longyan) Limited ("Longyan Cement"), with a total area of approximately 567,000 m², was subject to such potential risks as soil erosion due to soil desertification and poor water retention. Longyan Cement aimed to reinstate the mountains, eliminate potential risks, rehabilitate the environment, restore the ecology and build green mines. After thorough discussions with greening companies and the local forestry governmental department, Longyan Cement formulated afforestation plans of planting schima superba and camphor trees based on tests and identification of properties of the soil. Staff activities were organized to launch the greening work and plant trees. As of the end of 2017, more than 100,000 seedlings had been planted and the green coverage rate of the dumps had reached 90%. Striving to build a green enterprise, we fulfill corporate social responsibility with practical actions by building and maintaining a harmonious village-enterprise relationship.

矿山排土场占地 **56.7** 万平方米

The mine dump had a total area of approximately **567,000** m²

种植树苗 **10** 万多株 排土场绿化覆盖率 **90%**

More than **100,000** seedlings had been planted and the green coverage rate of the dumps had reached **90%**

责任故事三 平南水泥矿山治水

CSR Story III:
Water control for mines at
Pingnan Cement

华润水泥(平南)有限公司位于广西壮族自治区平南县,该地地处平原区内,且多属覆盖型岩溶区,易出现地面塌陷等地质灾害。平南水泥已开采的一二期露天矿山采用凹陷式开采方式,矿山三面邻水、地下岩溶地质发育,随着开采深度的加深,地下水越来越多的涌入矿坑,存在引发地面塌陷,建筑物地基沉降、结构开裂,沟渠干涸,农田与池塘漏水等次生地质灾害的风险。

为治理岩溶地区复杂条件下凹陷式开采矿山突涌水问题,华润水泥联合山东大学于2015年成立了联合创新项目攻关小组,以产学研联合创新的科研机制开展矿山治水工作,全力攻克这一难题。经过多次、反复技术方案论证,对比试验、效果检验,最终探索出地下岩溶水帷幕注浆治理技术,对涌水点实现成功封堵,彻底修复当地生态环境。

2017年3月,该项目所取得成果经多名中国工程院院士组成的项目鉴定委员会技术鉴定为达到国际领先水平,并建议在岩溶地区突涌水灾害治理中进一步推广应用。

项目的成功实施也为解决矿山凹陷开采涌水难题提供了示范和参考。

China Resources Cement (Pingnan) Limited ("Pingnan Cement") is located in Pingnan County, Guangxi Zhuang Autonomous Region. It lies in a flatland area covered with multiple layers of karst and prone to geological disasters such as ground collapse. The first and second phases of the exploited outdoor mines at Pingnan Cement adopted the cave mining method. Three sides of the mine are surrounded by water and the underground karst is active in development. There was inrush of more and more underground water into the mining pits as mining goes deeper, causing risks of secondary geological disasters such as ground collapse, subsidence of building foundations, structural cracks, dried-up ditches and water leakage of farmlands and ponds.

In order to control water inrush into mining pits caused by cave mining under complicated conditions in karst areas, CR Cement and Shandong University jointly established an innovation project research team in 2015 to launch water control work at mines through an innovative scientific research mechanism with the joint forces of the industry, universities and research institutes. Technology of water-curtain grouting treatment for underground karst was finally developed after numerous and repeated reasonings of technical proposals, comparative examinations and tests on results. The spots of water inrush had been successfully blocked off, and the local ecological environment was completely restored.

In March 2017, the project appraisal committee consisting of various scholars from the Chinese Academy of Engineering accredited the results of this project as achieving international pioneer standards, and recommended its further promotion and application for prevention of water inrush disasters in karst areas.

The successful implementation of this project had also set an example and reference for solving the problem of water inrush in cave mining.

