INDEPENDENT EVALUATION UNIT
OFFICE OF EVALUATION AND INTERNAL OVERSIGHT

INDEPENDENT TERMINAL EVALUATION

PEOPLE'S REPUBLIC OF CHINA

Integrated adoption of new energy vehicles in China

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Abbreviations and acronyms

Abbreviation	Definition
CDM	Clean Development Mechanism
CSAE	China Society for Automotive Engineers
ESMP	Environmental and Social Management Plan
EVs	Electric vehicles
GEF	Global Environment Facility
GHG	Greenhouse gas
IANEV	Integrated Adoption of New Energy Vehicles in China
ICE	Internal combustion engine
M&E	Monitoring and Evaluation
MEE	Ministry of Ecology and Environment (China)
MIIT	Ministry of Industry and Information Technologies (China)
MOF	Ministry of Finance (China)
MST	Ministry of Science and Technology (China)
NDRC	National Development and Reform Commission (China)
NEA	National Energy Administration (China)
NEE	National Executing Entity
PMO	Project Management Office
RBM	Results based management
RE	Renewable energy
TOC	Theory of change
UNIDO	United Nations Industrial Development Organization
V2G	Vehicle to grid

Glossary of evaluation-related terms

Term	Definition
Baseline	The situation, prior to an intervention, against which progress can be assessed.
Effect	Intended or unintended change due directly or indirectly to an intervention.
Effectiveness	The extent to which the development intervention's objectives were achieved, or are expected to be achieved.
Efficiency	A measure of how economically resources/inputs (funds, expertise, time, etc.) are converted to results.
Impact	Positive and negative, intended and non-intended, directly and indirectly, long term effects produced by a development intervention.
Indicator	Quantitative or qualitative factors that provide a means to measure the changes caused by an intervention.
Lessons learned	Generalizations based on evaluation experiences that abstract from the specific circumstances to broader situations.
Logframe (logical framework approach)	Management tool used to facilitate the planning, implementation and evaluation of an intervention. It involves identifying strategic elements (activities, outputs, outcome, impact) and their causal relationships, indicators, and assumptions that may affect success or failure. Based on RBM (results based management) principles.
Outcome	The likely or achieved (short-term and/or medium-term) effects of an intervention's outputs.
Outputs	The products, capital goods and services which result from an intervention; may also include changes resulting from the intervention which are relevant to the achievement of outcomes.
Relevance	The extent to which the objectives of an intervention are consistent with beneficiaries' requirements, country needs, global priorities and partners' and donor's policies.
Risks	Factors, normally outside the scope of an intervention, which may affect the achievement of an intervention's objectives.
Sustainability	The continuation of benefits from an intervention, after the development assistance has been completed.
Target groups	The specific individuals or organizations for whose benefit an intervention is undertaken.

Executive summary

The growth of China's electric vehicle (EV) market has been accompanied by a corresponding growth in demand for the electricity required to charge these vehicles. The *Integrated Adoption of New Energy Vehicles in China* (IANEV) project was developed to test strategies for decoupling the growth of EVs from a reliance on China's carbon-intensive national grid. IANEV explored this decoupling in two ways: (i) through bypassing the national grid and demonstrating how renewable energy (RE) could directly support EV charging and (ii) by demonstrating how EVs could improve the integration of REs within the national grid by using – for example – vehicle-to-grid technologies. The project tested technologies and processes through city-level pilot initiatives that deployed infrastructure such as charging stations, RE micro-grids, smart-meters and data monitoring centres. IANEV also undertook extensive policy work, developing policy recommendations, roadmaps, technical standards and institutional plans for both stimulating EV uptake and for supporting '*EV-RE integration*': the increased use of RE in EV charging, and the increased use of EVs as a means for supporting RE integration within the national grid. IANEV was supported by US$8.93m from the Global Environment Facility (GEF), with a further US$172m in cash and in-kind co-financing from Chinese institutions and delivery partners. UNIDO served as the GEF implementing agency, supporting project oversight and providing technical inputs where required. China's Ministry of Industry and Information Technologies (MIIT) served as the executing agency and appointed the China Society for Automotive Engineers (CSAE) to manage and monitor day-to-day delivery of IANEV. As the GEF's focal point in China, the Ministry of Finance (MOF) were also integral to project oversight.

This independent terminal evaluation assessed the entire intervention from the project's inception in July 2017 to its completion in late 2022. Overall performance was reviewed against the standard evaluation criteria of relevance, coherence, efficiency, effectiveness, progress to impact and sustainability. In addition to assessing overall results, the evaluation also aimed to identify recommendations to inform and strengthen UNIDO's future interventions.

The IANEV project was highly relevant to Chinese priorities and to the work of UNIDO and the GEF. The project was aligned with China's 12th and 13th Five-Year Plans and – by extension – was relevant to the priorities of the cities and regions that participated in the work. While the project's focus on EVs represented a new theme for both UNIDO and the GEF, the work and its targeted results nevertheless corresponded well to the mandates of both institutions. The project was extremely well-embedded within national political and legislative structures, and was highly complementary to other work being delivered in China. Particularly beneficial was the nature of the main delivery partner (CSAE), which had – and continues to have – an absolutely central role in the development and delivery of national automotive policy. The project's policy coherence also benefited from the involvement of the MIIT, the MOF, and the relevant city-level authorities.

Project delivery was largely efficient with only minor delays, most of which were outside the control of implementation partners (e.g. COVID). Project monitoring processes were generally sound, although they were disproportionately geared towards measuring quantitative indicators and contractual milestones, with only a limited amount qualitative data gathered. Moreover, the monitoring of GEF core indicators – particularly emissions reductions – was not systematic. An impressive volume of co-financing was secured, representing a 19:1 leverage ratio against the GEF grant. From UNIDO's perspective – and

in response to the GEF's increasing demand for projects to be implemented by National Executing Entities (NEEs) – IANEV served as a useful 'testing ground' for shifting project management away from a UNIDO-driven model towards a NEE-driven model. This process generated valuable learning that continues to inform UNIDO's approach to project delivery.

The project delivered – and in most cases exceeded – almost all agreed output targets and made substantial progress towards most outcomes. The project informed or supported the development of several policies and technical standards, engaged with and influenced numerous policymakers and decisionmakers, and contributed to a broader awareness around options for integrating RE and EVs. These achievements were underpinned by the valuable experience and learning generated through IANEV's demonstration projects. However, the activity and output-focused nature of the project's monitoring framework means that there was only limited evidence of progress towards qualitative outcomes such as institutional capacity development and behaviour change.

Ultimately, the project exceeded its emissions reductions targets, demonstrated the technical viability and commercial potential of EV-RE technologies, and supported some important policy developments. All this work has laid a strong foundation for delivering sustained impact within the participating cities and beyond.

Based on detailed feedback from project stakeholders and the evaluation's own findings, the following recommendations are made in order of priority, with a view to informing the design and strengthening of future UNIDO initiatives.

Ensure tools developed to support the NEE modality are shared across UNIDO

1. It is probable that donors (not just GEF) will increasingly encourage NEE-led modalities. **The UNIDO project team** should identify and package the most valuable learnings, processes and tools that were developed through IANEV to support the NEE-led operating modality. **UNIDO** should then ensure that this package informs future NEE-led projects that UNIDO are supporting.

Develop a systematic approach to project learning within NEE-led initiatives

2. While the NEE-led modality was effective, the limited involvement of UNIDO staff meant that there were few opportunities for UNIDO to extract learning from the project. Within any future NEE-led projects proposals, **UNIDO** should clearly define processes for gathering project learning. UNIDO staff can be closely involved in this process: this should be achievable without compromising the ownership and leadership of the NEE.

Ensure proportionate and balanced monitoring

3. IANEV's monitoring processes were sound, but there were an excessive number of indicators, almost all of which were quantitative in nature, meaning that very limited qualitative and outcome-level data was collected. During project development and implementation, **UNIDO and their implementing partners** should ensure that all indicators have a clear justification, and that monitoring frameworks routinely encompass a balance of quantitative and qualitative monitoring.

Define emissions reductions calculations methodologies during project design, and ensure their application throughout project implementation

4. Emissions reductions monitoring was not systematic, was mostly undertaken retrospectively rather than on an ongoing basis, and suffered from a lack of data quality assurance and robustness checking. **UNIDO and their implementing partners** should

ensure that any future projects aiming to deliver emissions reductions have calculation methodologies, baselines, assumptions and calculation factors confirmed during project design, and that the confirmed monitoring methods are applied throughout project implementation.

Improve approaches to the measurement of capacity development

5. **UNIDO** should develop clear guidance and tools for project developers, managers and delivery partners around how to measure institutional and individual capacity development.

1. Introduction

This report documents the terminal evaluation of the *Integrated Adoption of New Energy Vehicles in China* (IANEV) project. The report commences with an overview of the project, followed by a description of the evaluation's methodology. Findings are then presented in detail against the six key evaluation questions and criteria. Building on these findings, the project's performance is assessed against UNIDO's evaluation rating scales, conclusions are presented, and recommendations are provided for UNIDO and other project stakeholders.

2. Overview of the Project

2.1 Summary

2.1.1 China's rapid economic growth has been accompanied by a correspondingly rapid increase in vehicle use and private car ownership. Until recently, this expanding vehicle fleet was almost entirely internal combustion engine (ICE) based, resulting in increased greenhouse gas (GHG) emissions and decreased air quality. However, there has been a recent shift towards electric vehicles (EVs), with this shift encouraged by various government policies and incentives that recognise the environmental benefits of moving away from ICEs. But despite the significant uptake of EVs, the expected environmental benefits are not necessarily being delivered. EVs invariably rely on electricity drawn from China's carbon-intensive national grid: a growing EV fleet is helping to reduce local tailpipe emissions, but there are concerns that these tailpipe emission savings are being undermined by the corresponding requirement to generate more electricity through a carbon-intensive national grid. An increasing proportion of clean and renewable energy is laying the foundations for a less carbon-intensive grid, but – as with other countries – China's grid will continue to be reliant on fossil fuels for years if not decades to come.

2.1.2 Against that background, the IANEV project was developed to test strategies for decoupling the growth of EVs from a reliance on carbon-intensive electricity. IANEV aimed to explore this decoupling in two ways: (i) through bypassing the national grid and demonstrating how renewable energy (RE) could directly support EV charging through – for example – RE micro-grids and (ii) by demonstrating how EVs could improve the integration of REs within the national grid by using – for example – vehicle-to-grid (V2G) technologies to smooth out the intermittency challenges associated with RE.

2.1.3 To achieve this, IANEV aimed to test and demonstrate relevant technologies and processes through pilot initiatives in the cities of Shanghai and Qingdao[1]. Working with companies and local authorities that operated existing EV fleets, IANEV would support the deployment of infrastructure including (but not limited to) charging stations, RE micro-grids, smart-meters and data monitoring centres. In parallel with these physical pilots, IANEV also aimed to undertake an extensive programme of policy work. The project aimed to develop policy recommendations, roadmaps, technical standards and institutional plans for both stimulating EV uptake and for supporting '*EV-RE integration*': the increased use of RE in EV charging, and the increased use of EVs as a means for supporting RE integration within the national grid. All this work would be further supported by capacity development

[1] The original proposal included Yancheng as the second pilot city, but following a change of leadership within the Yancheng counterpart (and a corresponding de-prioritisation of the pilot) the project shifted most of Yancheng's anticipated pilot activities to Qingdao.

and awareness raising activity, targeted primarily at relevant decision-makers, but also at businesses and consumers more broadly.

2.1.4 IANEV was supported by US$8.93m from the Global Environment Facility (GEF), with the project proposal indicating that IANEV counterparts would provide a further US$117m in co-financing (cash and in-kind). UNIDO served as the GEF implementing agency, supporting project oversight and providing technical inputs where required. China's Ministry of Industry and Information Technologies (MIIT) served as the executing agency and appointed the China Society for Automotive Engineers (CSAE) to manage and monitor day-to-day delivery of IANEV, including the hosting of the Project Management Office (PMO). As the GEF's focal point in China, the Ministry of Finance (MOF) was also integral to project oversight. Other delivery partners included Shanghai International Automotive City, Qingdao TeLaiDian, and the Rugao New Energy Automobile Industrial Park. IANEV was guided by a Project Steering Committee, co-chaired by UNIDO and MIIT and comprised of relevant Ministries and national agencies. The project commenced in July 2017 and was completed in late 2022.

2.2 Expected results

2.2.1 Figure 1 summarises the main expected results (outcomes, outputs), as delivered through the five project components:

COMPONENT 1: Policies and Programs
Outcome 1: Drafted and recommended policies, technical standards, and guidelines that provide regulatory and planning elements, leading to the higher adoption of EV-RE integration schemes by city governments, vehicle manufacturers, and consumers, thus resulting in GHG emission reductions
Outputs • Recommended national level policy instruments (including roadmap, incentives) for the integration of EVs with RE available to government agencies for their consideration • Issuance of technical standards and specifications facilitating EV-RE integration and scale up, including those for smart charging systems, V2G systems, mobile charging systems, and use of retired EV batteries • Recommendations presented to transport sector authorities for incorporation of incentives for EV charging with RE in transport sector national carbon trading policies, including carbon trading rules for EVs powered by RE, to promote greater adoption of RE in the grids supplying electricity to EVs • City-level EV-RE integration and scale up plans, including replication plans for the adoption of best models demonstrated in pilot cities • Proposed institutional plan to establish responsibilities of and coordination among various government organizations for EV-RE integration
COMPONENT 2: Government Institutional Capacity Building
Outcome 2: Increased institutional capabilities and awareness of policymakers at national and local levels on the use of integrated EV-RE systems
Outputs • Training program for 100 city-level policy makers on EV-RE integration policies and demonstration experience • Four workshops conducted to validate the EV-RE integration policy and planning framework • International forums with participants from central government agencies and EV demonstration cities that disseminate international developments in and plans for EV-RE integration • Written materials on EV-RE integration strategically disseminated to policy makers
COMPONENT 3: Piloting of Technical Measures and Commercialization Approaches
Outcome 3: Two city-scale projects piloted, demonstrating the integration of EVs and RE, as well as other foundational work needed to achieve large-scale EV-RE integration

Outputs • Demonstration of integration of EVs with the power grid, needed as basis for EVs eventually to address intermittency issues of large-scale RE power incorporation into the grid • Demonstration of technically and commercially effective technologies (micro-grids, wind, solar, retired EV batteries) that enable distributed integration of EVs with RE, including technologies that send power back to micro-grids (e.g. V2G) • Demonstration of conditions and business models (greater density charging networks, mobile charging) that can stimulate scale-up of China's EV fleet, thus laying the ground work to realize the benefits of EV-RE integration on substantial scale • Demonstration of energy management centers that collect and manage data on dispersed EVs and retired EV battery packs used as storage for the grid, so that the charge and discharge of these devices can be managed
COMPONENT 4: Awareness Raising and Dissemination amongst Manufacturers, Suppliers, and Consumers
Outcome 4: Increased knowledge and capacity of business and consumer stakeholders, facilitating awareness, research and development, manufacture, operation, and maintenance with regard to EV-RE integration
Outputs • Dissemination of knowledge amongst industry players (vehicle manufacturers, charging equipment providers, power industry, and other relevant sectors) regarding EV-RE integration, to include forums, workshops, and establishment of industry alliances or associations • Awareness raised among current and future potential car sharing companies of various car sharing business models and integration of EVs with RE in car sharing businesses • Promotion of EV-RE integration to the general public by various methods (media, social organizations, social media) to raise awareness of and interest in EV-RE integration as a means of realizing the true environmental potential of EVs • An EV-RE integration demonstration center, created to raise awareness on the topic of EV-RE integration amongst consumers, companies using EVs, and industries related to RE or EV
COMPONENT 5: Monitoring and Evaluation
Outcome 5: A robust mechanism for M&E in place to ensure the attainment of project outcomes
Outputs • Project monitoring plan refined and executed • Data and information collected to measure certain project outcome and output level indicators, as well as indicators for project's ESMP • Project midterm review and terminal evaluation conducted • Recommendations and agreed upon action plan for long term project sustainability as part of follow-up to terminal evaluation

Table 1: IANEV's expected outcomes and outputs
(summarised from IANEV project document)

2.3 Project theory of change

2.3.1 Theories of change (TOCs) are a common management tool expressing the basic rationale behind an intervention. They describe the results an intervention aims to achieve, how the intervention works towards those results, and the main assumptions behind the intervention's approach. In turn, TOCs also support the identification of key elements that should be evaluated. As such, TOCs are frequently used as the starting point for developing evaluation approaches, and for identifying evaluation questions.

2.3.2 A TOC was not developed at project design, so the following TOC was constructed during the evaluation's inception phase, following a review of IANEV project documentation and through discussion with the project management team.

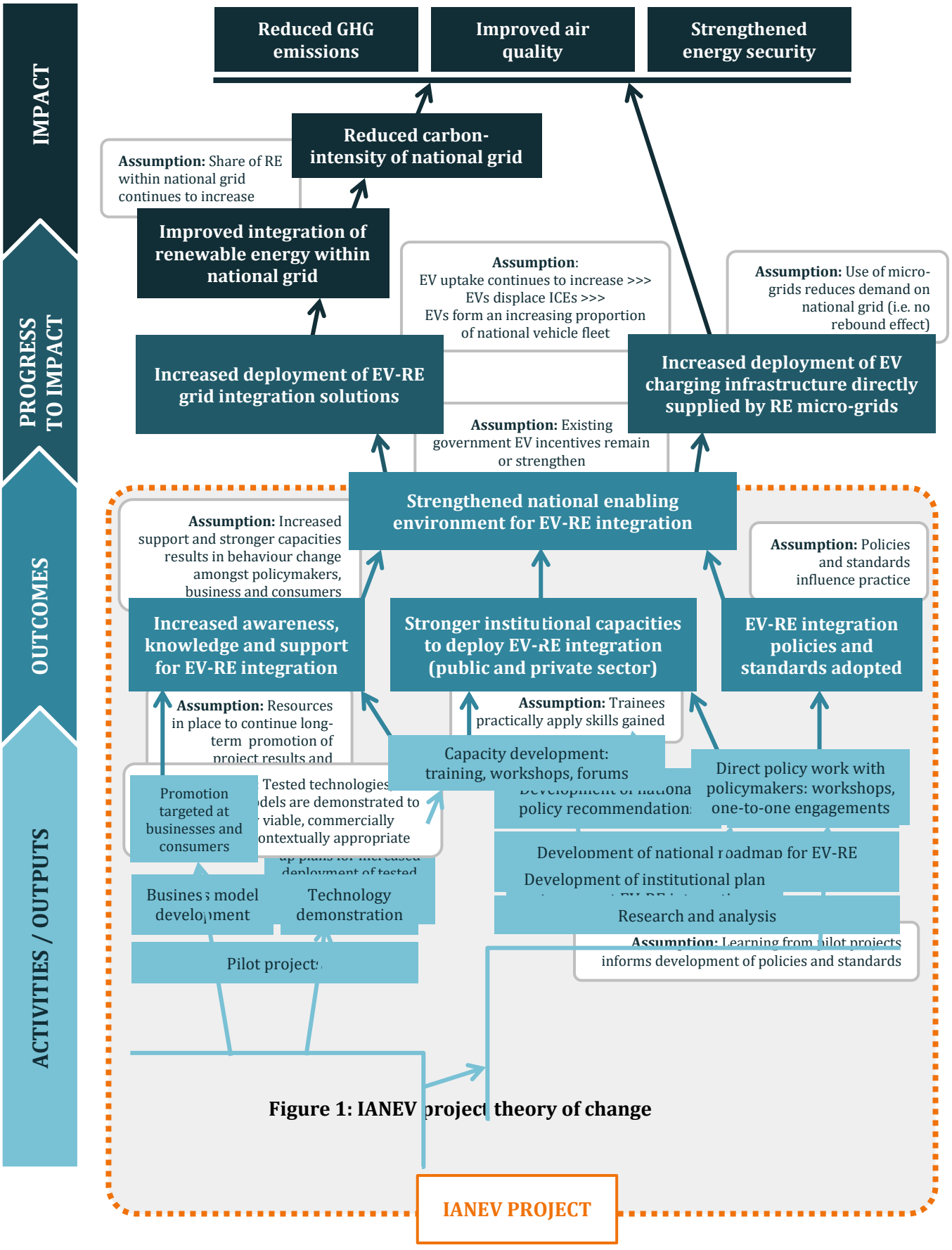

Figure 1: IANEV project theory of change

3. Evaluation methodology

3.1 Evaluation purpose, objectives, scope and audience

3.1.1 The overarching purpose of the evaluation was **to independently assess the project to help UNIDO improve performance and results of ongoing and future programmes and projects**. To achieve this – and as is standard for many evaluations – the evaluation had an **accountability** objective (assessing project performance and results) and a **learning** objective (improving actions).

3.1.2 IANEV documentation established the intervention's logic, its expected results (impacts, outcomes, outputs), and indicators that could be used to measure progress against those results. The terminal evaluation aimed to validate the project's internal monitoring data, assess progress towards the expected results and – where available – identify any unanticipated results.

Evaluation Objective 1 (accountability / results):
Assess project performance in terms of relevance, coherence, effectiveness, efficiency, sustainability and progress to impact.

3.1.3 While understanding progress towards results was essential for accountability purposes, the assessment of progress was then used as a foundation for **learning** what worked well (and why) and what didn't work so well (and why). To address this objective the evaluation assessed the broader IANEV strategy and processes, exploring elements such as planning and coordination. This assessment then helped the evaluation to develop an understanding of the project's overall performance.

Evaluation Objective 2 (learning / improvement):
Develop findings, lessons and recommendations for enhancing the design of **new** and implementation of **ongoing** projects by UNIDO.

3.1.4 The evaluation **scope** covered the entire project and all its activities, from the project's design, to its inception in July 2017, to its completion in late 2022.

3.1.5 The primary target **audiences** for the evaluation are:

- **UNIDO management**, particularly those with direct responsibility for the design and implementation of IANEV, for management of the UNIDO China country programme, and for the development of UNIDO's global EV-focussed portfolio.
- **MIIT and MOF:** MIIT is the project's executing agency and MOF is the GEF's focal point in China, so both Ministries had integral roles in IANEV's delivery. Given the centrality of their mandates to the adoption and delivery of EV-RE integration in China, both Ministries will continue to have significant influence on the dissemination, uptake and sustainability of any results achieved through IANEV.
- **Other governmental partners:** Several other ministries and government agencies were involved in the delivery or support of IANEV, most notably including the National Energy Administration (NEA), the Ministry of Science and Technology (MST), the National Development and Reform Commission (NDRC) and the Ministry of Ecology and Environment (MEE).
- **CSAE:** Appointed and overseen by MIIT, CSAE managed and monitored the day-to-day delivery of IANEV, including the hosting of the Project Management Office.

- **Other delivery partners:** CSAE also oversaw and coordinated the contributions from several other delivery partners, most notably Shanghai International Automobile City, Qingdao TeLaiDian, and the Rugao New Energy Automobile Industrial Park. In addition to helping project delivery, these partners are likely to have a continuing interest in any results achieved by IANEV, and in the longer-term prospects for EV-RE integration within China.
- The **GEF Secretariat**, who continue to develop and deliver a Global E-Mobility Program of EV-focussed grants and projects.

3.2 UNIDO and GEF evaluation requirements

3.2.1 In addition to the evaluation purpose, objectives and theory of change, the terminal evaluation was also guided by the evaluation policies and requirements of both UNIDO and the GEF. As a GEF Agency, UNIDO's approach to terminal evaluations of GEF projects is tightly aligned to the GEF's overarching evaluation guidelines. Consequently, this evaluation adhered to those guidelines, including the application of UNIDO and GEF's rating scales for project implementation / execution, outcomes, sustainability, and M&E.

3.3 Evaluation framework

3.3.1 The evaluation purpose and objectives, the theory of change, and the evaluative requirements of both UNIDO and the GEF all provided the basis for the **evaluation framework**, which in turn underpinned and guided the whole evaluation approach. The framework was structured against the standard **OECD-DAC criteria** agreed for the evaluation (relevance, coherence efficiency, effectiveness, sustainability). In line with UNIDO policy and acknowledging the early nature of the project's potential contributions to long-term impact, the OECD-DAC 'impact' criterion was simplified to instead measure '**progress to impact**'.

3.3.2 The framework identified **key evaluation questions**, supported by guiding **sub-questions**. The full framework is presented in Annex 1, but the six key evaluation questions are presented below:

1. **Relevance:** How relevant was the project to the needs and priorities of China, and to the mandates of UNIDO and the GEF?
2. **Coherence:** To what extent was the project aligned with – and complementary to – other work being delivered in China?
3. **Efficiency:** How efficient was project delivery?
4. **Effectiveness:** Did the project achieve its planned outputs and outcomes?
5. **Progress to impact:** How likely is it that the project's outputs and outcomes will contribute to long-term impacts?
6. **Sustainability:** To what extent are the project's outputs and outcomes likely to be sustained in the long term?

Table 2: Key evaluation questions

3.4 Tools

3.4.1 Guided by the evaluation framework, the following common evaluation tools were applied to gather and analyse qualitative and quantitative information:

- **Interviews:** 22 individuals participated in interviews, conducted through a combination of remote meetings (via Zoom) and face-to-face discussions in China.
- **Site visits:** The National Evaluation Expert undertook a site visit to Qingdao, observing the IANEV-supported infrastructure, and interviewing key stakeholders within the city. The Expert also visited the offices of CSAE in Beijing.
- **Desk review:** A comprehensive literature review considered all relevant documentation such as material produced through the project (including mid-term review, progress reports, policy documents, technical guidelines, Steering Committee minutes and financial data), and relevant external documentation (including policies and legislation influenced by IANEV).
- **UNIDO and GEF ratings:** All UNIDO evaluations are required to rate a series of evaluation and project criteria against a six-point Likert scale, ranging from 'highly unsatisfactory' to 'highly satisfactory'[2]. The project's ratings are presented in section 5.3 of this report.

3.5 Analysis and reporting

3.5.1 Data analysis and the development of emerging findings were undertaken collectively by the evaluation team. As far as possible, emerging findings were derived through triangulation of data from multiple sources and tools, helping to ensure the robustness and internal validity of the assessment.

3.5.2 Report preparation (including development of UNIDO and GEF evaluation ratings) was also undertaken collectively, but with the initial report drafting led by the evaluation team leader. A first line of quality assurance was provided by the evaluation team's EV-RE advisor. The draft report was then submitted to UNIDO's Independent Evaluation Division, who circulated it to key stakeholders and managed the commenting process. The evaluation team then considered stakeholder comments, adjusting the draft report where appropriate, then submitted a final version to the UNIDO Independent Evaluation Division. The Independent Evaluation Division quality assured the final report and solicited UNIDO's management response for inclusion in the final product.

3.6 Evaluation team

3.6.1 The evaluation team comprised one international Team Leader, one national Evaluation Expert, and one international Advisor providing technical guidance on EV and RE. All three team members were contracted by UNIDO for this specific evaluation. The team received logistical support (interview scheduling, site visit support) from UNIDO offices in Vienna and Beijing, and from CSAE's Project Management Office in Beijing.

3.7 Limitations

3.7.1 The evaluation collected and analysed quantitative and qualitative data. As with many evaluations, a considerable amount of this (particularly qualitative data) was based on individual perceptions and opinions. To mitigate any subjective bias, findings were – as far as possible – triangulated across sources, and across tools. Where potentially important findings were identified but it was not possible to triangulate (e.g. data/finding provided by a single source) this is explicitly noted within the evaluation report.

[2] See page 24, UNIDO Evaluation Manual, 2019.

3.7.2 The ongoing coronavirus pandemic prevented the possibility of efficient international travel, so the evaluation Team Leader was unable to travel to China. However, the presence of the National Evaluation Expert within China went a long way to mitigating COVID-related travel difficulties. Always adhering to local restrictions, the National Expert was able to undertake a site visit to Qingdao and to CSAE's Beijing offices, and was able to undertake face-to-face discussions with many stakeholders.

3.7.3 As noted within the above theory of change, IANEV represented only an early step towards longer-term environmental and energy security impacts. The UNIDO evaluation criterion of '**progress to** impact' is helpful here, as it recognises the long timescales to impact that are often inherent to UNIDO investments such as IANEV. In line with this approach – and instead of attempting to identify discrete impacts – the evaluation assessed the extent to which the project laid the **foundations for impact**.

4. Findings

4.1 Relevance

EVALUATION QUESTION 1:
How relevant was the project to the needs and priorities of China, and to the mandates of UNIDO and the GEF?

SUMMARY OF FINDINGS
The IANEV project was highly relevant to Chinese priorities and to the work of UNIDO and the GEF. The project was aligned with China's 12th and 13th Five-Year Plans and – by extension – was relevant to the priorities of the cities and regions that participated in the work. While the project's focus on EVs represented a new theme for both UNIDO and the GEF, the work and its targeted results nevertheless corresponded well to the mandates of both institutions.

Highly relevant to Chinese priorities

4.1.1 The IANEV project was of clear, direct relevance to Chinese priorities, not least because it was aligned with strategic objectives first laid out in the country's 12th Five-Year Plan (2011-2015), which included a national policy and plan for EV technology development. These national objectives (hence the IANEV project's alignment to those objectives) were reiterated within the country's 13th Five-Year Plan (2016-2020). IANEV also responded directly to the Five-Year Plans' intended approach of using demonstration cities to test, strengthen and upscale EV technologies and infrastructure.

4.1.2 IANEV's relevance was further assured through the intimate involvement of Chinese counterparts during project conceptualisation and design. At the outset, high level support for the initiative was secured from MOF (the GEF Focal Point in China) and from MIIT (the GEF Executing Agency). Under delegation from MIIT, the project development process was then led by CSAE with guidance from UNIDO. CSAE's extensive experience of the automotive sector within China – including their involvement in supporting the development of the country's nascent EV sector – placed them in an ideal position to identify the most appropriate project locations and partners, and to ensure that the work remained relevant to China's national plans.

Well aligned with GEF and UNIDO mandates

4.1.3 The project concept was equally relevant to the mandates of both UNIDO and the GEF, given the work's ultimate focus on sustainable industrial development and emissions reductions. This relevance was deepened during the project's design, with one of UNIDO's primary roles being to ensure that the proposal was fully aligned with UNIDO's mandate and with the GEF's requirements.

4.1.4 Despite this clear relevance, there was a degree of caution within UNIDO during the project's conceptualisation. This was perhaps understandable, as IANEV represented one of UNIDO's (and indeed the GEF's) first forays into the EV sector: as such, there was very limited in-house expertise, and no overarching EV programme for the project to fit into. However, these concerns were allayed as – during the design process – it became increasingly apparent that UNIDO's delivery partners (particularly CSAE) were technically proficient and well-capacitated to manage the work.

4.2 Coherence

EVALUATION QUESTION 2:
To what extent was the project aligned with – and complementary to – other work being delivered within China?

SUMMARY OF FINDINGS
The project was extremely well-embedded within national political and legislative structures, and was highly complementary to other work being delivered in China. Particularly beneficial was the nature of the main delivery partner (CSAE), which had – and continues to have – an absolutely central role in the development and delivery of national automotive policy. The project's policy coherence also benefited from the involvement of the Ministry of Industries and Information Technology, the Ministry of Finance, and the relevant city-level authorities.

Project design was inherently coherent with regional and national policy

4.2.1 As above, IANEV responded to – and was aligned with – China's 12th and 13th Five-Year Plans. The project was therefore *inherently* coherent with national policy. The Five-Year Plans' call for regional and city-level involvement in the development of China's EV sector also ensured that IANEV was equally coherent with regional and city-level policy agendas and developments.

Informing ongoing and future policy development

4.2.2 Beyond the project's fundamental alignment with *current* national and regional policy, the intention was always for IANEV to inform *ongoing and future* policy development, based on the experience of project delivery. To support policy development the project firstly undertook extensive data collection, analysis and research, with most of this based on IANEV's pilot work in Shanghai and Qingdao. Most immediately, this research was then used to inform the project's technical standards and policy recommendations. However, the status of CSAE was also critical here, as the institution has had – and continues to have – a central influence over policy development across China's automotive sector. Consequently, CSAE was able to use its existing channels, networks and contacts to ensure learning and policy recommendations were shared with the most relevant audiences and decision-makers. While it is too early to measure the long-term influence of IANEV policy-focussed work, CSAE are at least in a strong position to ensure that IANEV's policy-relevant outputs can continue to influence ongoing and future policy development.

Coherence further strengthened through involvement of UNIDO and GEF

4.2.3 Several interviewees noted that the support of both UNIDO and GEF – and the associated necessity of having cross-ministry involvement from both MOF and MIIT – gave IANEV a higher profile within China than would otherwise have been the case. The same interviewees felt that this higher profile also raised the perceived importance of the project, which in turn helped to build engagement and commitment from all levels of government and from the private sector. Some interviewees went further, suggesting that IANEV's Shanghai pilot provided a (relatively rare) example of all levels of government – city, regional, national – working in close conjunction, with this coherence being at least partly a result of the visibility and profile afforded by UNIDO and GEF's involvement.

4.2.4 In a similar vein, some individuals involved in the Shanghai pilot also noted how the project helped to bring private sector companies together to deliver a single, coherent strategy. These interviewees felt that without IANEV the same companies would have developed independent, competing (potentially conflicting) strategies for engaging with the EV sector. Instead, IANEV provided a framework within which companies could support delivery of – and benefit from – a shared workplan and goal.

4.3 Efficiency

EVALUATION QUESTION 3:
How efficient was project delivery?

SUMMARY OF FINDINGS

Project delivery was largely efficient with only minor delays, most of which were outside the control of implementation partners (e.g. COVID). Project monitoring processes were mostly rigorous, although they were disproportionately geared towards measuring quantitative indicators and contractual milestones, with only a limited amount qualitative data gathered. Impact-level monitoring against GEF's core indicators could also have been more systematic throughout the project's implementation. An impressive volume of co-financing was secured, representing a 19:1 leverage ratio against the GEF grant. From UNIDO's perspective – and in response to the GEF's increasing demand for projects to be implemented by National Executing Entities – IANEV served as a useful 'testing ground' for shifting project management away from a UNIDO-driven operating model towards a National Executing Entity-driven operating model. This process generated valuable learning for UNIDO that continues to inform their approach to project delivery.

Efficient project delivery despite delays

4.3.1 From the outset IANEV benefited from a well-defined and appropriate design, as evident within the clear, detailed project document. This extended to a well-detailed, realistic Environmental and Social Management Plan (ESMP). Upon implementation CSAE and other execution partners largely delivered on time and on target, with progress supported by transparent and rigorous project monitoring (discussed in more detail below). Interviewees unanimously pinpointed the strength of CSAE and its robust project management as the central factor in IANEV's efficient delivery. Some UNIDO staff went as far to say that CSAE were one of the strongest and 'easiest' delivery partners that they have worked with.

4.3.2 As with other GEF-supported projects that were operating during this time period, IANEV's progress was affected by the COVID pandemic. But despite the unavoidable delays the project ultimately delivered or exceeded all the expected results.

4.3.3 The project also demonstrated well-justified, pragmatic adaptiveness to changes in the operating context. For example, originally IANEV planned to deliver two demonstration initiatives in Shanghai and Yancheng. However, shortly after the project's approval the city authority leadership in Yancheng changed, with the new administration not as interested or supportive of the project. IANEV partners responded quickly, securing the support of the city authorities in Qingdao. Most of the demonstration activities were subsequently relocated from Yancheng to Qingdao. Despite some inevitable delays in initiating the

relocated work, this change of plan and shift of cities was successful and – crucially – did not ultimately affect the delivery of the originally agreed results.

Project monitoring was generally sound, but insufficiently outcome-focussed

4.3.4 The efficient delivery and robust project management can be partly attributed to IANEV's extensive monitoring processes. The project's results framework included 85 indicators, with progress against most of these indicators routinely reported against (see Annex 4). The monitoring methodologies behind these indicators were mostly sound, generating timely and reliable data that was fed into project decision-making and contract management processes. Monitoring also extended to the ESMP's indicators, which were aligned with, and embedded in, the main project monitoring framework.

4.3.5 While project monitoring clearly supported IANEV's day-to-day management, there was an excessive number of indicators. By definition every indicator – including very simple ones – require resources to monitor and review. Even where the basic gathering of data is automated and/or is notionally 'cost-free', human resources are always required to present, review and potentially act on the reported data. In IANEV's case there is no evidence to suggest that the high number of indicators had a negative effect on project performance. However, monitoring 85 separate indicators (with some of those having sub-indicators) implies that significant effort and resource was expended on project monitoring. Indeed, several interviewees noted that indicator monitoring was one of the most resource intensive processes within IANEV.

4.3.6 Moreover, the informational value of some indicators was not always clear. IANEV's indicators were mostly activity and output focussed: only 15 indicators (17%) were pitched at outcome or impact level. Additionally, almost all of the indicators that were pitched as 'outcome' indicators were only actually tracking *output*-level progress rather than *outcomes* (the *substantive changes or effects* of the project's work). The following table demonstrates how some of IANEV's 'outcome' indicators could have been more appropriately formulated to track *actual* outcomes:

OUTCOME 1: [IANEV] policies, technical standards, and guidelines…leading to the higher adoption of EV-RE integration schemes by city governments, vehicle manufacturers, and consumers…	
IANEV 'outcome' indicator (actually an output indicator): Number of different types of standards adopted to facilitate EV-RE integration and scale-up	**Outcome-focussed alternative:** Number of EV-RE integration schemes based on IANEV-developed policies, standards and guidelines
OUTCOME 2: Increased institutional capabilities and awareness of policymakers at national and local levels on [EV-RE integration schemes]	
IANEV 'outcome' indicator (actually an output indicator): Total number of policymakers reached by project's capacity building and awareness work regarding EV-RE integration	**Outcome-focussed alternative:** Number of national and local authorities (and/or policymakers) agreeing that they have sufficient capacity to support development of EV-RE integration schemes

Table 3: Alternative outcome-focussed indicators for IANEV

4.3.7 To reiterate, the monitoring system *did* gather extensive, rich detail on output-level progress and achievements. However, the limited outcome-level data constrained the potential for tracking and understanding what are arguably the most important results of the project, namely IANEV's ongoing contribution to changes in policy, capacity and behaviour, and the ultimate effects of those changes.

Impact-level monitoring was not systematic

4.3.8 Results against *impact* level indicators – and specifically the project's GEF Core Indicators [3] – were calculated using nationally accepted methodologies [4], which were ultimately in line with internationally accepted Clean Development Mechanism (CDM) methodologies. However, enquiries from our Evaluation Team regarding discrepancies between reported emissions reductions and reported volume of renewable energy generated resulted in revision of some project data. This revealed that there was limited quality assurance of impact-level data, and it is not clear that impact-level monitoring was systematically undertaken during project delivery. Instead, calculation methodologies (e.g. for emissions reductions and energy usage) were applied retrospectively only as the project neared completion. While this has ultimately delivered reliable data, there was a missed opportunity here to apply well-established methodologies (including baseline calculation) from the project's outset. This would have been a preferable approach, particularly given the importance of these impact-level indicators to GEF and UNIDO.

Substantial volume of co-financing secured

4.3.9 Projects supported through the GEF Trust Fund are required to secure co-financing, with Upper Middle Income Countries such as China expected to obtain a 5:1 co-financing leverage ratio[5] (i.e. raising an additional US$5 for every US$1 of GEF financing). IANEV's intention was to greatly exceed this ambition, with the original proposal anticipating a 13:1 leverage ratio (US$117m co-financing targeted against a US$8.93m GEF grant). The eventual leverage ratio was significantly higher at over 19:1 (US$172m raised). While over 90% of this co-financing was categorised as 'in-kind', it is notable that the in-kind inputs comprised almost entirely of tangible, quantifiable inputs such as infrastructure and vehicles[6].

	Projected co-financing (at design)	Actual co-financing (at completion)
Cash	US$69,280,000	US$15,783,423
In-kind	US$47,720,000	US$156,204,400
Total	US$117,000,000	US$171,987,823
Leverage ratio	**13:1**	**19:1**

Table 2: Projected vs actual co-financing (against a US$8.93m GEF grant)
Source: IANEV Project Document, IANEV Progress Reports

4.3.10 As anticipated within the project document, the great majority of the co-financing was provided by the participating demonstration cities, Shanghai and Qingdao. Both cities

[3] Direct emissions avoided; Indirect emissions avoided; Energy saved
[4] National Development and Reform Commission guidelines on Accounting Methods and Reporting of Greenhouse Gas Emissions from Industrial Enterprises
[5] *GEF Policy on Co-financing*, 2018, page 4.
[6] Often (perhaps usually) in-kind co-financing for GEF projects is comprised of 'soft' inputs such as office space and seconded staff.

were incentivised to finance and deliver the IANEV demonstrations by China's 12th and 13th Five-Year Plans, which – as above – called for city-level testing, strengthening and upscaling of EV technologies and infrastructure.

IANEV enabled UNIDO to test and refine new project execution modalities

4.3.11 By the time of IANEV's design, the GEF was placing increasing emphasis on their long-standing policy of moving projects away from Implementing Agency-led management, towards National Executing Entity (NEE) led management. UNIDO was supportive of this shift, and was mindful that the GEF was not the only donor moving in this direction. From the outset, it was clear to UNIDO that IANEV's main delivery partner – CSAE – was a well-established, high capacity and technically proficient institution. Given that comparatively 'safe' starting position, UNIDO elected to use IANEV as one of their first forays into supporting an NEE-led project.

4.3.12 Prior to IANEV, UNIDO's systems and institutional structures were largely geared towards supporting projects that were led or directly delivered by UNIDO and/or in partnership with other multilateral institutions. IANEV and its NEE-led modality required the development of new procedures and system processes, most consequentially for procurement. UNIDO had to balance – on the one hand – reduced oversight and control over procurement with – on the other hand – largely unchanged liabilities and accountabilities in terms of governance and reporting to the GEF and UNIDO's own governing bodies. These demands necessitated the development of new guidance and templates (for recruitment, procurement, technical and financial reporting etc.) and new internal processes relating to the administrative and institutional assessment of recommended NEEs. Inevitably this was a time-consuming process during the project's inception and did result in a slower than anticipated start-up. However, all IANEV partners felt that the effort was worthwhile, with a management model that was ultimately efficient, serving IANEV well.

4.3.13 The trade-off around decentralised control vs oversight is likely to be a recurring issue for future NEE-led projects. A key lesson for UNIDO from the IANEV experience is that the approach to future NEE-led projects – and particularly the extent to which UNIDO can depend on an NEE's procurement and other procedures – will have to be considered on a case-by-case basis. The primary consideration will be NEE capacity: how experienced is the NEE, and how well aligned are their competencies and processes with best business practices and funding partner requirements? While this initial technical and administrative assessment of NEE capacity implies more resource-intensive project design and/or inception phases, IANEV did at least enable UNIDO to undertake a significant amount of groundwork, to the point that UNIDO now has a solid library of guidance and templates that can be applied to NEEs of varying capacities.

4.3.14 Aside from requiring new procedures and processes, the devolving of project management to an NEE also represented a *cultural* shift for UNIDO: IANEV required UNIDO staff to adopt a considerably more 'hands off' role than had been the case for previous projects. In the case of IANEV, all interviewees agreed that this arrangement worked well. CSAE's day-to-day project management was highly proficient, underpinned by transparent reporting and responsive communications. Consequently, the workload for UNIDO staff was considerably lower than for other projects, mostly limited to project monitoring and to advising CSAE and other counterparts on how to meet GEF policies and requirements.

4.3.15 At the same time, UNIDO staff often noted that the lower level of engagement meant that there were correspondingly less opportunities for UNIDO to extract learning from the

project. CSAE's monitoring reports were thorough, but they couldn't compensate for the rich experience and learning that UNIDO staff would ordinarily gain from *direct* project management and delivery. Conversely though, some of IANEV's delivery partners felt that the most time intensive part of the work was identifying and reporting data and learning back up the chain to UNIDO. The clear implication is that future NEE-led projects could benefit from UNIDO's closer involvement in project learning, and/or a more systematic approach to project learning.

4.3.16 While UNIDO's experience with CSAE and IANEV was positive, several interviewees noted that CSAE had exceptional institutional administrative capacity, with one interviewee indicating that CSAE was the "*strongest*" delivery partner they had every worked with. Some interviewees cautioned that IANEV should therefore *not* be viewed as a typical NEE-led project, and that expectations and resources should be managed accordingly. Other NEEs in other contexts (including countries with lower technical and administrative capacity) will likely require significantly more support from UNIDO, and the relatively low level of management resources that UNIDO allocated to IANEV is almost certainly not going to representative of the likely requirements for future NEE-led initiatives.

4.4 Effectiveness

EVALUATION QUESTION 4:
Did the project achieve its planned outputs and outcomes?

SUMMARY OF FINDINGS
The project delivered – and in most cases exceeded – almost all agreed output targets, and made substantial progress towards most outcomes. The project informed or supported the development of several policies and technical standards, engaged with and influenced numerous policymakers and decisionmakers, and contributed to a broader awareness around options for integrating RE and EVs. All of these achievements were underpinned by the valuable experience and learning generated through IANEV's demonstration projects. However, the activity and output-focused nature of the project's monitoring framework means that there was only limited evidence of progress towards qualitative outcomes such as institutional capacity development.

4.4.1 To assess effectiveness, the evaluation considered each of the four main project components (the fifth component – M&E – was more internally focussed and was assessed within the 'efficiency' section above). The following section presents findings against each component in turn.

COMPONENT 1	COMPONENT 2	COMPONENT 3	COMPONENT 4
Policies and Programs	Government Institutional Capacity Building	Piloting of Technical Measures and Commercialization Approaches	Awareness Raising and Dissemination amongst Manufacturers, Suppliers, and Consumers

4.4.2 IANEV's component 1 was designed to deliver the corresponding Outcome 1. The outcome was supported by eight outputs and – as for other IANEV results – the evaluation validated that generally sound monitoring processes were used to track progress. As below, most outputs were achieved or exceeded (see Annex 4 for full self-reported data):

Outcome 1: Drafted and recommended policies, technical standards, and guidelines that provide regulatory and planning elements, leading to the higher adoption of EV-RE integration schemes by city governments, vehicle manufacturers, and consumers, thus resulting in GHG emission reductions	
Outputs	**Summary of progress**
1.1A: National level roadmap to facilitate effective EV-RE integration and scale up that achieves consensus among stakeholders	**All outputs and corresponding targets achieved or exceeded**. IANEV informed and directly supported the development of multiple research outputs, guidelines, technical standards and safety standards. Some of these outputs tangibly influenced relevant national policies and development plans, with – for example – the Roadmap (output 1.1) directly informing MIIT's *Development Plan of New Energy Vehicle Industry 2021-2035*.
1.1B: Suggested policies and framework that promote balancing of grid load with power generated via utilization of EVs	
1.1C: Proposed national policies to regulate and incentivize systems for charging of EVs with RE	
1.1D: Proposed national policy instruments to regulate & incentivize use of retired EV batteries	
1.2: Issuance of technical standards and specifications facilitating EV-RE integration and scale up	
1.3: Recommendations to transport authorities for incorporation of incentives for EV charging with RE in transport sector national carbon trading policies, including carbon trading rules for EVs powered by RE	
1.4: City-level EV-RE integration and scale up plans, including replication plans for the adoption of best models demonstrated in Shanghai and Qingdao	**Output exceeded**, with draft plans developed for 9 cities (against a target of 6) including Shanghai and Qingdao.
1.5: Proposed institutional plan to establish responsibilities of and coordination among various government orgs for EV-RE integration*	A **coordinated management approach** was developed and continues to be implemented in **Shanghai**, bringing together the various relevant technical, commercial and public authorities. However, a broader, national-level institutional plan was not developed.*

*Discussed in more detail under component 2, below

Table 4: Summary of progress against Component 1 Outputs

Multiple policies, guidelines and standards developed with IANEV support

4.4.3 IANEV supported the development of an extensive suite of documentation relating to EV-RE integration, covering multiple technologies and processes. Most evaluation interviewees identified the National Roadmap as being the most influential, noting that it fed directly into MIIT's 15-year development plan for the EV sector. Many interviewees also singled out IANEV's research and technical documentation around V2G technologies as being pioneering, representing the most substantive body of work to be undertaken on this subject within China.

Foundations in place for longer-term policy influence

4.4.4 In combination, all this documentation established a clear foundation upon which to further develop local, regional and national EV-RE integration policy and legislation. Much of IANEV's outputs – in particular the various technical and safety standards – stand to underpin the practical development of EV-RE integration and infrastructure within China.

Moreover, the *potential future influence* of all this work is high, primarily due to the depth of national ownership of the work, and of the institutional position and strength of IANEV's delivery partners (particularly MIIT and CSAE).

4.4.5 While the *potential* future influence of the work is high, the extent of the work's influence *at this stage* is limited. IANEV's Outcome 1 envisaged that the project's policy work would "*[lead] to the higher adoption of EV-RE integration schemes by city governments, vehicle manufacturers, and consumers*". There is clear evidence that IANEV's documentary outputs have already supported some city government plans to develop EV-RE infrastructure, but there is less evidence that the work has yet influenced manufacturers or consumers.

4.4.6 Given the usual time-lags between policy development, policy enactment and policy influence, it is unsurprising – expected, even – that little evidence is available of IANEV's documentary outputs having a broader influence within China. However, there is a risk that the long-term influence of IANEV's documentation will *not* be measured or understood: currently there are no systems or even *expectations* that IANEV's long-term, post-project influence and results will be monitored.

COMPONENT 1	**COMPONENT 2**	COMPONENT 3	COMPONENT 4
Policies and Programs	**Government Institutional Capacity Building**	Piloting of Technical Measures and Commercialization Approaches	Awareness Raising and Dissemination amongst Manufacturers, Suppliers, and Consumers

4.4.7 IANEV's component 2 was designed to deliver the corresponding Outcome 2. The outcome was supported by four outputs, all of which were met or exceeded (see Annex 4 for full self-reported data):

Outcome 2: Increased institutional capabilities and awareness of policymakers at national and local levels on the use of integrated EV-RE systems	
Outputs	**Summary of progress**
2.1: Training program for 100 city-level policy makers on EV-RE integration policies and demonstration experience	**All outputs and corresponding targets met or exceeded**. Component activities and outputs were largely comprised of production and dissemination of written materials, and hosting and/or participation in industry-relevant forums and workshops.
2.2: Four workshops conducted to validate the EV-RE integration policy and planning framework	
2.3: International forums with participants from central government agencies and EV demo cities that disseminate international developments in and plans for EV-RE integration	
2.4: Written materials on EV-RE integration strategically disseminated to policy makers	

Table 5: Summary of progress against Component 2 Outputs

Significant awareness raising amongst policymakers of EV-RE integration

4.4.8 Component 2 activities and outputs were mostly focused on awareness raising amongst policymakers within China. This was delivered through written materials, delivery of (and participation in) industry-level forums, and through targeted workshops and policy

consultations. Project monitoring data indicates that over 100 policymakers participated in this work.

Extent to which institutional capability was developed is unclear

4.4.9 While the extent of awareness raising amongst policymakers is clear, there is markedly less evidence about progress towards the other substantive element of Outcome 2, namely "*increased institutional capabilities*". IANEV's monitoring framework was mostly geared towards measurement of quantitative indicators, and did not include qualitative indicators that, for example, could have measured the extent to which institutional competencies and resources for EV-RE integration were developed. So while it is clear that IANEV reached over 100 policymakers through 'awareness work', it is not clear what the ultimate effect of that work was, and/or whether policymaker or institutional capacity was strengthened.

4.4.10 This lack of clarity around the extent of institutional strengthening also encompasses work that was planned under output 1.5, namely '*Proposed institutional plan to establish responsibilities of and coordination among various government organizations for EV-RE integration*'. Coordination mechanisms and responsibilities were well developed within the project itself, within Shanghai and – to an extent – within Qingdao. However, the expectation for Output 1.5 was that a plan would be developed for *national* level coordination. Relating to this gap, some interviewees identified a key remaining barrier to EV-RE integration within China as being the need for stronger inter and intra-Ministry coordination. Some interviewees felt that greater clarity and coherence was particularly required around the respective responsibilities of key institutions such as MIIT (national mandate includes the EV sector) and NRDC (national mandate includes renewable energy development).

COMPONENT 1	COMPONENT 2	COMPONENT 3	COMPONENT 4
Policies and Programs	Government Institutional Capacity Building	**Piloting of Technical Measures and Commercialization Approaches**	Awareness Raising and Dissemination amongst Manufacturers, Suppliers, and Consumers

4.4.11 IANEV's component 3 was designed to deliver the corresponding Outcome 3. The outcome was supported by 11 outputs and numerous targets, all of which were met or exceeded (see Annex 4 for full self-reported data):

Outcome 3: Two city-scale projects piloted, demonstrating the integration of EVs and RE, as well as other foundational work needed to achieve large-scale EV-RE integration	
Outputs	**Summary of progress**
3.1: Demonstration of integration of EVs with the power grid, needed as basis for EVs eventually to address intermittency issues of large-scale RE power incorporation into the grid	**All outputs and corresponding targets met or exceeded**. Proof of concept within Chinese city-level context demonstrated for all tested technologies.
3.2A: Demonstration of integration of EVs into RE micro-grids	
3.2B: Demonstration of V2G technologies and pilot commercial systems	
3.3A: Demonstration of greater density of the EV stationary charging network	

Outcome 3: Two city-scale projects piloted, demonstrating the integration of EVs and RE, as well as other foundational work needed to achieve large-scale EV-RE integration	
3.3B: Demonstration of alternatives to stationary charging stations, in particular mobile charging station vehicles	
3.3C: Demonstration of business models to scale-up the number of EVs	**Target met**, although indicator was only partially relevant to output ('*Number of hourly car rental passenger vehicles in Shanghai's EVCARD fleet*'). Nevertheless, valuable learning gathered on commercial opportunities and barriers.
3.4: Demonstration of energy management centers	**All outputs and corresponding targets met or exceeded**. Data centres established and continuing to provide data that is informing ongoing development of EV-RE integration and upscaling work.
3.5A: Detailed monitoring and assessment of project demos of EV integration with power grid	
3.5B: Detailed monitoring and assessment of project demos of RE-EV micro-grids	
3.5C: Detailed monitoring and assessment of aspects of project demos related to the use of retired EV batteries	
3.5D: Detailed monitoring and assessment of aspects of project demos related to scale-up and increased concentration of China's EV fleet and charging infrastructure	

Table 6: Summary of progress against Component 3 Outputs

Demonstrations provided technical proof of concept in Chinese context

4.4.12 Component 3 represented the most resource-intensive part of IANEV. The majority of project co-financing was directed towards the procurement and installation of Component 3's extensive infrastructure, all of which supported the testing of several technologies and processes relating to EV-RE integration. This included charging stations capable of supporting RE micro-grid to EV charging, but also EV to grid (V2G) systems. This component also explored mobile charging stations, including mobile stations that used repurposed (including retired and reconditioned) EV battery packs to provide charging services. Another significant element was the development and operation of energy management data centres in both pilot cities. These centres enabled (and continue to enable) extensive real-time data collection, which in turn supported the efficient management of charging networks and informed several of IANEV's policy and research outputs, as delivered through Component 1.

Uncertain commercial viability for some processes

4.4.13 All of this demonstration work has confirmed the *technical* feasibility of the tested technologies within the Chinese context, at least at the city-level. However, many evaluation interviewees acknowledged that the *commercial* viability for some processes has not yet been established. For example, project stakeholders were unanimously positive about the technical lessons learned through IANEV's testing of V2G technologies and processes, with several interviewees identifying IANEV's contribution to the V2G knowledge base as being one of the project's most important achievements. But at the same time, interviewees noted that – while technically feasible – a viable commercial model for V2G in Chinese cities has not yet been identified. Clear business cases for V2G will depend on the far larger-scale manufacture and deployment of V2G-capable vehicles than is currently the case. While this scenario is arguably on the horizon, evaluation interviewees acknowledged that it would take several years before V2G business opportunities become commercially viable.

4.4.14 But the pilot projects also demonstrated how some EV-RE processes *could* be commercially viable. Most tangibly, IANEV demonstrated the EV-RE business case for companies with large EV fleets, such as public transport providers, car hire companies, or taxi companies. In these instances, IANEV demonstrated that the cost of developing an independent, off-grid, RE-based charging network was a commercially viable option. Some interviewees noted that the complete control that companies would have over these off-grid networks also make it likely that such deployments are – eventually – likely to be the first places that financially viable V2G processes can be established.

Need to ensure IANEV learning around commercial viability is codified

4.4.15 Arguably, IANEV's testing of EV-RE business cases and commercial viability will be the area of greatest interest to external audiences within China and beyond. EV-RE technical opportunities and barriers are generally well-known (or at least well-documented), but the area of greatest uncertainty remains how to support and sustain broader uptake of EV-RE integration technologies. IANEV undoubtedly has much valuable learning to share on this front, and already many of the project's documentary outputs will be of use to stakeholder in other contexts.

4.4.16 However, IANEV's own monitoring framework was not well-orientated to systematically gathering learning in this area. While IANEV's Output 3.3C was '*Demonstration of business models to scale-up the number of EVs*', the corresponding indicator was only partially relevant: '*Number of hourly car rental passenger vehicles in Shanghai's EVCARD fleet*'. This indicator was only capable of measuring *one* aspect of *one* potential business model and – as with indicators throughout the framework – was purely quantitative in nature, with no qualitative aspects. Qualitative measures could have been particularly informative here, given the likely links between uptake / commercial viability and company and consumer behaviour change. Yet despite this gap, it is clear that – as above – IANEV does have valuable learning (positive and negative) to share on business models and commercial viability. It is important that UNIDO and its delivery partners now look beyond the project's monitoring framework in order to codify and share all the relevant lessons that have arisen from the project.

COMPONENT 1	COMPONENT 2	COMPONENT 3	**COMPONENT 4**
Policies and Programs	Government Institutional Capacity Building	Piloting of Technical Measures and Commercialization Approaches	**Awareness Raising and Dissemination amongst Manufacturers, Suppliers, and Consumers**

4.4.17 IANEV's component 4 was designed to deliver the corresponding Outcome 4. While the main outcome target of reaching 8 million consumers was not achieved, the outcome was supported by 10 outputs, all of which were met or exceeded (see Annex 4 for full self-reported data):

Outcome 4: Increased knowledge and capacity of business and consumer stakeholders, facilitating awareness, research and development, manufacture, operation, and maintenance with regard to EV-RE integration	
Outputs	**Summary of progress**

4.1A: Forums for industry, including both domestic & international players active in the China market	**All outputs and corresponding targets met or exceeded**. Component activities and outputs were largely comprised of hosting and/or participation in industry-relevant forums and workshops, and broader promotional activities (media briefings, social media campaigns, production of written and video-based materials). For Output 4.3E, IANEV supported the formation of the *Charging Infrastructure and Intelligent Energy Synergy Special Committee*, under the *Electric Vehicle Industry Technology Innovation Strategic Alliance*. The Special Committee comprises 43 members from industry and academia, meeting 2-3 times per year.
4.1B: Dissemination to industry of project's EV-RE information base	
4.1C: Meetings publicizing EV-RE related technical standards	
4.1D: Technical operation and maintenance workshops related to EV-RE integration	
4.1E: Establishment of industry alliance or association subcommittee for promoting and advancing EV-RE integration and liaising with government on EV-RE integration policy	
4.2: Awareness raised among current and future potential car sharing companies of various car sharing business models and integration of EVs with RE in car sharing businesses	
4.3A: Media promotion of EV-RE integration, raising awareness of the public	
4.3B: Promotion of EV-RE integration to consumers via social organizations	
4.3C: Outreach on social media platforms and cooperation with social media companies	
4.4: An EV-RE integration demonstration center, created to raise awareness on EV-RE integration	

Table 7: Summary of progress against Component 4 Outputs

Reach of awareness raising was below anticipated target, but still significant

4.4.18 As for Component 2 (which focused on engagement with policymakers), IANEV's Component 4 activities and outputs were mostly focused on awareness raising. Targets included industry actors (fleet owners, manufacturers, supply chain participants), and the general public. The outcome-level target was to reach 8 million consumers through awareness-raising work. While it is unlikely that this target has been achieved, project monitoring data estimates that well over 1 million consumers were reached, mostly through radio broadcasts and social media campaigns. While less substantial in number, IANEV promotional work also reached a significant number of companies and industry actors, primarily through direct interactions such as forums and workshops.

No detail on how awareness raising has influenced capacities or behaviours

4.4.19 As with Component 2, IANEV's monitoring data for Component 4 demonstrates the extent of *outreach and awareness raising*, but it does not provide substantive evidence around the extent to which – as per the Outcome 4 wording – *capacity* was increased. Again, the lack of qualitative indicators prevents an understanding of what industry capacities were developed, how they were developed, any remaining competency gaps, and so on. Similarly, no detail has been gathered on whether and how all IANEV's public-focused awareness raising work has – for example – influenced attitudes or behaviour change amongst consumers.

4.5 Progress to Impact and Sustainability

Progress to Impact and *Sustainability* are two separate evaluation criteria linked to two separate questions, but during the evaluation it became clear that there was considerable overlap between the related findings. Consequently, both criteria are addressed together within the following section.

EVALUATION QUESTION 5:
How likely is it that the project's outputs and outcomes will contribute to long-term impacts?

EVALUATION QUESTION 6:
To what extent are the project's outputs and outcomes likely to be sustained in the long term?

SUMMARY OF FINDINGS
The project has exceeded its emissions reductions targets, has demonstrated the technical viability and commercial potential of EV-RE technologies, and has supported some important policy developments. All this work has laid a strong foundation for delivering sustained impact within the participating cities and beyond. While there are still risks to sustainability and some potential barriers to the broader uptake of EV-RE approaches, the learning generated through the project indicates how these risks and barriers can be addressed.

Impact-level results already evident

4.5.1 For UNIDO interventions, impact-level results are often (perhaps *mostly*) long-term in nature, only identifiable well after a project has concluded. But by the time of the project's conclusion in late 2022, IANEV had already delivered tangible, significant impacts. Most notably, the project had greatly exceeded its targets against the agreed GEF indicators:

IANEV Indicator	GEF equivalent	Target	Actual
Direct GHG emissions reduced from integration of EVs with RE and from scale-up of EV use beyond business as usual, based on the project demos (tCO_2eq)	6.2: Direct emissions avoided	25,629 t	**126,181 t**
Indirect GHG emissions reduced from integration of EVs with RE and from scale-up of EV use beyond business as usual, based on replication of the project demos (tCO_2eq)	6.2: Indirect emissions avoided	62,181 t	**2,008,653 t**
Amount of RE used to charge EVs in China via micro-grids and smart charging (both direct via project demos and indirect via replication of demos) (MWh)	6.3: Energy saved*	69,465 MWh	**Direct: 140,461 MWh** **Indirect: 2,555,204 MWh**

*While the IANEV indicator did not measure *energy saved*, the data can be interpreted as the amount of national grid-derived energy that was *avoided*

Table 8: Progress against IANEV impact-level indicators[7]

4.5.2 Notwithstanding the above-noted shortcomings with impact-level monitoring, these indicated achievements are impressive, with the indirect emissions (and energy saved) as a result of early replication in other cities clearly demonstrating the potential impact that any further upscaling of the work could achieve.

4.5.3 Beyond these immediate results, IANEV has also laid solid foundations for further impacts. The extensive documentary outputs – policy recommendations, technical guidance,

[7] All data revised since IANEV Final Report (Apr 2022) following enquiries from Evaluation Team (see paragraph 4.3.8 above)

safety standards, and so on – are significant in themselves. However, the potential influence of these outputs is arguably greater than the case for many other projects, due to the position and strength of the institutional 'owners' of these outputs. Both MIIT and CSAE are very well-established institutions, and continue to have integral roles in the development of China's EV sector, and in the development of EV-RE integration within the country. Many evaluation interviewees noted that MIIT and CSAE are highly influential, powerful institutions that have the mandate and capacity to directly influence the course and evolution of EV-RE integration at city, regional and indeed national level. As such, the learning and outputs from IANEV have obvious potential to inform and support the future of the sector in China.

4.5.4 Although less immediate that the project's emissions reductions and less assured than the project's policy influence, IANEV's work on business model development also has the potential to underpin longer-term impacts. The commercial viability of specific approaches has been demonstrated (particularly where EV-RE can be used in conjunction with centrally-managed vehicle fleets), but IANEV also identified approaches that did *not* prove to be commercially viable, at least at this stage (for example, private V2G charging): the negative learning from IANEV is arguably just as valuable and informative as the positive learning.

Identifying how IANEV's initial progress towards impact can be sustained

4.5.5 The theory of change (page 7, above) summarised the long-term rationale of IANEV. In considering how IANEV's initial progress to impact can be sustained, it is instructive to apply the evaluation's findings to the theory of change and – in turn – to identify where IANEV has most clearly contributed to long-term changes, but also where most attention will be required in the future. The following diagram provides summary assessments of progress towards each of the theory of change's elements. The presence of several elements that are assessed as 'red' (not started / no progress) should not necessarily be interpreted as a shortcoming of IANEV. Rather, the theory of change describes the *long-term* pathway to impact. Given that IANEV represented an early step in that process, it is expected that several elements will have not yet been delivered or even initiated. However, the remainder of this section considers which theory of change elements could be most influential on the long-term sustainability of IANEV's achievements.

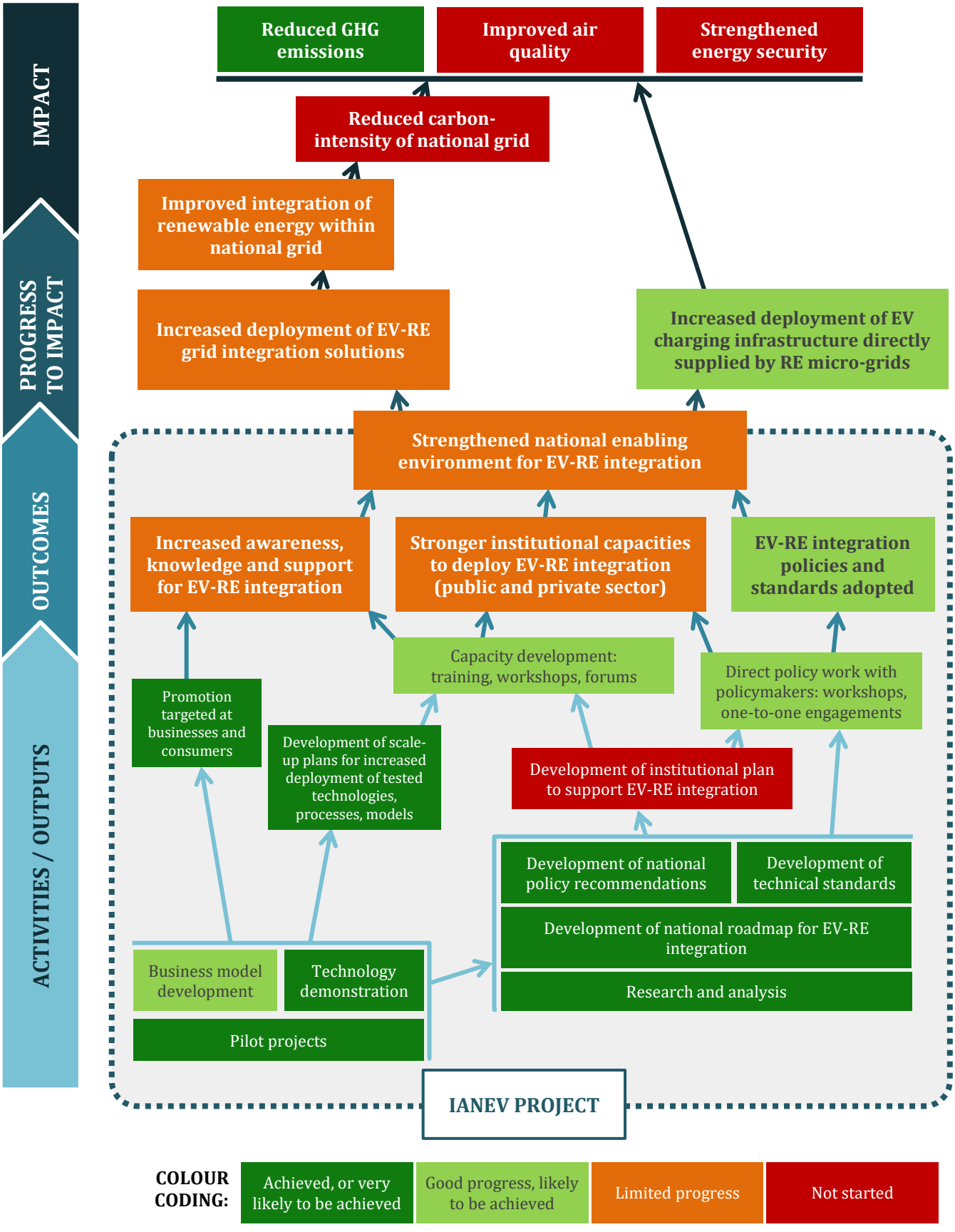

Figure 2: Assessment of progress against theory of change

Strong foundations for sustainability in place

4.5.7 As above, IANEV delivered most of the agreed outputs and met or exceeded most of the project's targets. The assessment of progress against the theory of change – and in particular the amount of 'green' elements at the lower end of the results pathway – illustrate how these output-level achievements have established a strong base upon which longer-term impact can now be developed. Indeed, some clear progress higher up the theory of change is already evident, with tangible achievements at outcome-level and even at impact-level, due to the project's early emissions reductions.

Strengthening the enabling environment

4.5.8 But the extent to which these achievements can be sustained and upscaled will depend on other elements within the theory of change being delivered. For example, if EV-RE is going to contribute to a less carbon-intensive national grid, then by definition this is going to require increased deployment of EV-RE grid integration solutions. That increased deployment of EV-RE is almost certainly going to require a stronger national enabling environment for EV-RE. IANEV has already made a significant contribution to establishing the enabling environment, particularly through its policy-related outputs and through the technical proofs-of-concept delivered through its practical demonstrations in Shanghai and Qingdao. However, it is not clear whether or how IANEV made substantive contributions to other critical elements of the enabling environment, such as strengthening institutional capacities for EV-RE deployment, building widespread support for EV-RE, or changing consumer attitudes and behaviour towards EVs and EV-RE solutions.

4.5.9 As noted above, some evaluation interviewees felt that more work was still required to clarify responsibilities and build stronger coordination between the relevant Ministries and institutions that are overseeing and/or operating within the EV-RE sector. These uncertainties could perhaps have been resolved had IANEV managed to deliver the 'institutional plan' (project Output 1.5), but the project has at least raised the profile of EV-RE amongst the relevant institutions, and – to an extent – has raised awareness of some of the remaining policy and institutional bottlenecks that present a risk to EV-RE's growth. Of course, IANEV has now concluded, so any remaining gaps in the enabling environment will need to be addressed through other projects, or through the continued contributions of MIIT, CSAE and other central stakeholders in the EV-RE sector.

Broader growth of EV sector will help to sustain IANEV's results

4.5.10 Even considering these potential barriers, the prospects are very strong that IANEV's results *will* be sustained and EV-RE *will* be upscaled within China. Most consequentially, the size and trajectory of the EV sector within China is dramatically different from when IANEV was originally conceptualised. Of course, the growth in manufacturing, deployment and uptake of EVs happened in parallel to IANEV, and it is not realistic to ascribe any of that broader growth to the work of the project. But these broader developments only strengthen the case for the widespread deployment of EV-RE technologies and processes, particularly when considering another significant development since IANEV's conceptualisation, namely the Paris Agreement and the correspondingly increased focus on decarbonisation and emissions reductions.

4.5.11 Given this changed context, there is now a high (near-certain) likelihood that EV-RE deployment will increase in the coming years. Against that background, perhaps the clearest contribution that IANEV's partners can now make to the ongoing growth and sustainability

of the EV-RE sector will be to ensure that the IANEV's learning and outputs continue to be made visible to the right stakeholders, and continue to be as influential as possible.

4.6 Gender mainstreaming

No systematic approach to gender

4.6.1 Although IANEV's design was otherwise strong, that design was not informed by any kind of gender analysis, in spite of the fact that the project's gender marker was assigned as 2A, meaning that the project would pay significant attention to gender and was expected to contribute gender equality[8]. Equally, no gender strategy was formulated to support project implementation. While several of the project's performance indicators gathered sex-disaggregated data, it is not clear whether this data was subsequently analysed, or whether it had any value or influence on project-level decision making.

4.6.2 The project was conceptualised before GEF strengthened their policy and ambition on gender quality in 2017. As such, IANEV did meet the GEF's (limited) gender mainstreaming requirements as they were in 2015. However, given the project's gender marker 2A following UNIDO 2015 gender policy, its focus on transport – including a considerable emphasis on public transport – the near absence of any kind of gender analysis or strategy should be considered a significant gap within the project.

[8] Since 2015 all UNIDO technical assistance projects have been assigned a gender marker and their design are screened based on a gender mainstreaming check-list before approval. UNIDO's gender marker is in line with UN System-wide action plan (SWAP) requirements, with four categories: 0 — no attention to gender, 1 — some/limited attention to gender, 2a — significant attention to gender, 2b — gender is the principal objective (https://www.unido.org/sites/default/files/files/2019-11/UNIDO%20Gender%20Strategy%20ebook.pdf)

5. UNIDO project evaluation ratings

In addition to the main assessment against standard evaluation criteria (relevance, coherence, efficiency, effectiveness, progress to impact, sustainability), evaluations of UNIDO-supported projects routinely assess specific aspects of an intervention's delivery. The following section summarises (and restates, where appropriate) the evaluation's findings on **performance of partners**, and on **factors facilitating or limiting the achievement of results**, particularly with regards to M&E and results-based management. The section concludes with a table (standard to all UNIDO evaluations) that summarises performance ratings for each component of the project's design, delivery and management.

5.1 Performance of partners

UNIDO

5.1.1 IANEV represented one of UNIDO's first forays into NEE-led project execution. Consequently, the demands on UNIDO staff and systems were quite different from 'business-as-usual' for the organisation. Considerably more control over day-to-day management was decentralised to UNIDO's delivery partners in China, which necessitated the development of new processes and – to an extent – a cultural shift amongst UNIDO staff. While all this work did result in some initial delays during project start-up, UNIDO and their partners were ultimately highly positive about the delivery modality and the relationship between all of IANEV's partners. The experience has also strengthened UNIDO's readiness for future NEE-led projects. The processes, guidance and templates developed for IANEV can be readily reused or repurposed for other projects, and the experience of UNIDO staff involved in IANEV will be useful for other UNIDO staff in the future.

5.1.2 However, one area for improvement identified by UNIDO staff was around project learning: staff felt that their reduced involvement in day-to-day project oversight and delivery meant that it was more challenging to identify and gather lessons and experience from the project. Although project monitoring was highly detailed, it couldn't compensate for the rich experience and learning that UNIDO staff would ordinarily gain from *direct* project management and delivery.

National Counterparts

5.1.3 CSAE was a very well-capacitated and highly appropriate national counterpart, not least because of its integral role within – and influence over – the development of China's EV sector. Its project management was robust and monitoring was generally sound, with highly detailed, transparent reporting provided to UNIDO throughout. As noted above, one evaluation interviewee indicated that CSAE was the "*strongest*" delivery partner they had every worked with. Consequently, CSAE were the ideal partner with which UNIDO could test and develop their approach to NEE-led project modalities.

5.1.4 IANEV was also well-supported by MIIT and MOF, both of whom readily engaged with the project as and when required.

Donor

5.1.5 The GEF had limited involvement beyond providing funding. However, a GEF representative did visit the project during its initial stages, and this visit brought a good degree of positive visibility to the work within China.

5.2 Factors facilitating or limiting the achievement of results

5.2.1 Paragraphs **4.3.4-8** provide a full analysis of the programme's performance with regards to M&E and results-based management (RBM). In summary though, IANEV's efficient delivery and robust project management can be partly attributed to the project's extensive and generally sound monitoring processes. The monitoring framework was comprised of 85 indicators, all measured and reported through rigorous monitoring processes. However, the number of indicators was excessive, with indicators predominantly quantitative in nature. Unfortunately, the limited qualitative and outcome-level data constrained the potential for tracking and understanding IANEV's ongoing contribution to changes in policy, capacity and behaviour, and the ultimate effects of those changes. Moreover, monitoring of impact-level indicators was not systematic.

5.3 Performance ratings table

5.3.1 Evaluations of UNIDO-supported interventions routinely provide performance ratings for each component of a project's design, delivery and management. Performance is assessed against UNIDO's six-point rating scale, which ranges from 'highly unsatisfactory' (score 1) to 'highly satisfactory' (score 6).

5.3.2 Additionally, GEF-funded UNIDO projects are assessed (although not necessarily rated) against three programmatic elements *not* covered by UNIDO's ratings, namely (i) **need for follow-up** (on mismanagement, negative impacts etc.), (ii) **materialization of co-financing**, and (iii) **environmental and social safeguards**.

5.3.3 Based on the foregoing findings and analysis, the following presents ratings and summary assessments for each of the UNIDO and GEF performance components.

Project element		Summary assessment		Rating
A	**IMPACT (OVERALL)**	Early, significant impacts already delivered around emissions reductions; clear potential and good likelihood of further impacts in the future		Highly satisfactory (6)
B	**PROJECT DESIGN (OVERALL)**			
1	Overall design	Well-defined and appropriate design, as evident within the clear, detailed project document		Highly satisfactory (6)
2	Logframe	Clear and logical, but excessive volume of indicators with virtually no qualitative aspects		Moderately unsatisfactory (3)
C	**PROJECT PERFORMANCE (OVERALL)**			Highly satisfactory (6)
1	Relevance	Highly relevant to National priorities and to the work of UNIDO and the GEF		Highly satisfactory (6)
2	Coherence	Extremely well-embedded within national political and legislative structures, and was highly complementary to other work being delivered in China.		Highly satisfactory (6)
3	Effectiveness	Most output targets achieved or exceeded, substantial progress towards most outcomes.; but only limited evidence of progress towards qualitative outcomes such as institutional capacity development		Satisfactory (5)
4	Efficiency	Largely efficient with only minor delays (outside control of partners); impressive volume of co-financing secured		Highly satisfactory (6)
5	Sustainability of benefits	Despite gaps in enabling environment, conducive context means highly likely benefits will be sustained		Highly satisfactory (6)
D	**CROSS-CUTTING PERFORMANCE (OVERALL)**			
1	Gender mainstreaming	While the project met the GEF's requirements as they were in 2015, the absence of *any* gender analysis or strategy is a significant gap within the project.		Unsatisfactory (2)
2	M&E	Despite weak logframe, monitoring and reporting was mostly sound; useful mid-		Moderately unsatisfactory (3)

Project element		Summary assessment		Rating
		term review conducted; however, impact-level monitoring was not systematic.		
3	Results-based management	Data and reporting helped to inform project direction and decision-making, but some inappropriate indicators may have given rise to perverse incentives		Moderately satisfactory (4)
E	**PARTNER PERFORMANCE (OVERALL)**			
1	UNIDO	Well-regarded by National Counterparts, providing valued technical inputs in a timely manner		Highly satisfactory (6)
2	National Counterparts	Strong capacity, highly appropriate institutions provided robust management throughout		Highly satisfactory (6)
3	Donor	Limited inputs, but highly visible support during project initial stages and funds provided on schedule		Highly satisfactory (6)
F	**OVERALL ASSESSMENT**			Highly satisfactory (6)
-	**GEF:** Need for follow-up	No issues identified.		
-	**GEF:** Materialization of co-financing	**See paras 4.3.9-4.3.10 above (Efficiency) for full analysis** Co-financing of US$172m received (leverage ratio 19:1) against target of US$117m		
-	**GEF:** Environmental and Social Safeguards	Well addressed through UNIDO's own systems, underpinned by a detailed, realistic ESMP. While monitoring of the ESMP was well-integrated with broader project monitoring, this also meant that ESMP monitoring faced the same shortcomings as broader project monitoring.		

6. Conclusions and recommendations

6.0.1 IANEV was a highly relevant and coherent intervention that was tightly aligned with Chinese national priorities and plans. Project delivery was efficient, benefiting in particular from the strong management and leadership of CSAE. Almost all of the agreed outputs and output targets were delivered, and in most cases were exceeded. Substantial progress was also made towards most outcomes, and – ultimately – IANEV has already delivered impact-level results, significantly exceeding its agreed emissions reductions targets.

6.0.2 Crucially, IANEV has laid some important foundations for the ongoing development and uptake of EV-RE integration within China. The two pilot initiatives within Shanghai and Qingdao generated extensive learning, demonstrating technical proof-of-concept of several processes and technologies, and building greater understanding around the opportunities and barriers to the commercial viability of EV-RE deployments. In parallel to (and informed by) the pilot initiatives, IANEV's policy and standards-focused work has resulted in an extensive set of documentary outputs. These outputs have clear potential to influence future policy, and already go a long way towards establishing comprehensive, consistent technical and safety standards for the EV-RE sector.

6.0.3 Prospects for sustainability are also strong. The continued growth of the EV sector – coupled with the increasing global and national focus on emissions reductions and the continued development of EV-RE technology – mean that increased deployment of EV-RE integration is a near certainty. IANEV's experience could be invaluable for accelerating the EV-RE sector's development, so it is vital that IANEV's learnings and outputs are made visible to the right stakeholders and continue to be as influential as possible. Here too the prospects are strong, given the institutional position, mandates and influence of IANEV's delivery partners, particularly MIIT and CSAE.

6.0.4 While the ultimate results of IANEV were highly positive, there were some aspects that – in retrospect – could have been even more efficient and effective. Based on detailed feedback from project stakeholders and the evaluation's own findings, the following recommendations are made, with a view to informing the design and strengthening of future UNIDO initiatives.

Ensure learning and tools developed to support the NEE operating modality are shared across UNIDO

6.0.5 IANEV represented one of the first times that UNIDO applied a National Execution Entity (NEE) led project modality. Overall, the experience was positive: CSAE was an exceptionally strong NEE, so the risks to UNIDO were low. CSAE's strength also gave UNIDO the space to develop, test and refine their approach, resulting in the development of a set of processes and tools that can be used in future NEE-led projects. It is probable that donors (not just GEF) will increasingly encourage NEE-led modalities, so UNIDO should ensure that the learning from IANEV is shared across the organisation.

Recommendation 1

The UNIDO project team should identify and package the most valuable learnings, processes and tools that were developed through IANEV to support the NEE-led operating modality. **UNIDO** should then ensure that this package informs future NEE-led projects that UNIDO are supporting.

Develop a systematic approach to project learning within NEE-led initiatives

6.0.6 Despite the clear, comprehensive reporting provided by CSAE, the limited day-to-day involvement of UNIDO staff meant that there were limited opportunities for UNIDO to extract learning from the NEE-led project. Conversely though, some of IANEV's delivery partners felt that the most time intensive part of the work was identifying and reporting data and learning back up the chain to UNIDO. The clear implication is that future NEE-led projects could benefit from UNIDO's closer involvement in project learning, and/or a more systematic approach to project learning.

Recommendation 2

Within any future NEE-led project proposals, **UNIDO** should clearly define processes and responsibilities for identifying and sharing project learning. It will be beneficial for UNIDO staff to be closely involved in this process: this should be achievable without compromising the ownership and leadership of the NEE.

Ensure proportionate and balanced monitoring

6.0.7 IANEV's monitoring processes were mostly sound. However, the project's monitoring framework contained an excessive number of indicators (85), some of which had limited value for either understanding project progress or informing project decision-making. At the same time, all indicators had to be monitored, reviewed, reported and potentially acted on, implying that significant effort was expended, yet with at least some of this monitoring effort having unclear value. Moreover, the indicators were predominantly quantitative in nature, meaning that very limited qualitative and outcome-level data was collected. Consequently, there was a lack of data and evidence around the extent of progress towards some of the project's outcomes, particularly 'softer' results such as policy influence, institutional capacity strengthening, and consumer attitudes and behaviour change.

Recommendation 3

UNIDO and their implementing partners should ensure that project monitoring frameworks contain a proportionate number of indicators. During project development, quality assurance processes should ensure that all indicators have a clear justification, and that the potential informational value of any given indicator is not outweighed by the costs of monitoring that indicator.

As part of that quality assurance process, UNIDO should also ensure that monitoring frameworks routinely encompass a balance of quantitative and qualitative monitoring.

Define and confirm emissions reductions calculation methodologies during project design, then ensure their implementation

6.0.8 Although emissions reductions were an expected impact for IANEV – and were a critical indicator for the GEF – the project's approach to monitoring of emissions reductions was not systematic and was mostly undertaken retrospectively rather than on an ongoing basis. This evaluation team identified discrepancies that revealed a lack of data quality assurance and robustness checking. Applying a predefined methodology during the project's execution would have allowed the project to test the quality and breadth of data collected, in turn providing an opportunity to manage any shortfalls. The data involved would have also been useful for overseeing the general progress of the project.

Recommendation 4

When considering similar projects, **UNIDO and their implementing partners** should ensure that any future projects that aim to deliver emissions reductions have calculation methodologies confirmed during project design. All relevant baseline data should also be confirmed, and all assumptions and calculation factors should be stated explicitly. During project implementation, the monitoring of emissions reductions should then be wholly based on the agreed methodology (if the methodology requires amendment during implementation – including any changes to assumptions and calculation factors – such amendments should be clearly documented).

Improve approaches to the measurement of capacity development

6.0.9 Related to the lack of qualitative monitoring, IANEV did not have a systematic approach to measuring institutional capacity strengthening, despite this being an important dimension of the project's outcomes. While the project routinely monitored the number of training workshops and the number of workshop participants, no substantive data was gathered around – for example – how institutions or participants subsequently applied any training, or what influence workshops had on organisational or individual practices. This appears to be a regular monitoring gap with UNIDO projects, despite capacity development often being an important component of UNIDO's work.

Recommendation 5

UNIDO should develop clear guidance and tools for project developers, managers and delivery partners around how to measure institutional and individual capacity development.

7. Lessons-learned

DEFINITION OF 'LESSONS LEARNED'
Generalizations based on evaluation experiences that abstract from the specific circumstances to broader situations.

1. Moving away from Implementing Agency-led project management modalities towards NEE-led modalities will almost certainly require (for *all* partners) the development of new procedures and processes, and some shifts in institutional cultures. Wherever possible, Implementing Agencies should 'test' their first foray into NEE-led modalities with a well-established, high-capacity, strong partner NEE.

2. The extent to which Implementing Agencies can depend on an NEE's procurement and other procedures has to be considered on a case-by-case basis. A primary consideration will be NEE capacity: how experienced is the NEE, and how well aligned are their competencies and processes with best business practices and funding partner requirements?

3. When an NEE-led operating model is proving to be effective, by definition there will a lower level of day-to-day engagement from the Implementing Agency. However, this introduces a risk that there will be correspondingly less opportunities for Implementing Agencies to extract learning from the project.

4. An intervention's policy-focused work is likely to be more successful if national delivery partners have existing or prior involvement in the formulation and/or oversight of domestic policy implementation

5. Interventions whose designs are tightly aligned with national plans and priorities should be more readily able to access domestic co-financing.

6. Regardless of thematic or sectoral focus, all projects need a mix of output and outcome indicators, and a mix of qualitative and quantitative measures. If there are no outcome-level indicators in place, it's going to be difficult – if not impossible – to measure outcomes.

Annex 1: Evaluation Framework

The evaluation purpose and objectives, the theory of change, and the evaluative requirements of both UNIDO and the GEF all provided the basis for the **evaluation framework**, which in turn underpinned and guided the whole approach. The framework was structured against the standard **OECD-DAC criteria** agreed for the evaluation (relevance, coherence, efficiency, effectiveness, sustainability). In line with UNIDO policy and acknowledging the early nature of the project's potential contributions to long-term impact, the OECD-DAC 'impact' criterion was simplified to instead measure 'progress to impact'.

Key evaluation questions	Guiding sub-questions
RELEVANCE	
1. **How relevant was the project to the needs and priorities of China, and to the mandates of UNIDO and the GEF?**	**1.1** To what extent was the project relevant to the needs, priorities and strategies of China and of the participating cities?
	1.2 To what extent was the project relevant to UNIDO's mandate?
	1.3 To what extent was the project relevant to the GEF's mandate and priorities?
COHERENCE	
2. **To what extent was the project aligned with – and complementary to – other work being delivered within China?**	**2.1** How did the project identify and coordinate with other EV and RE-focused interventions in China?
	2.2 How did the project ensure alignment with existing policy development processes in China and within the participating cities?
	2.3 How did the project ensure alignment with existing institutional and capacity development processes in China and within the participating cities?
EFFICIENCY	
3. **How efficient was project delivery?**	**3.1** Was the project's plan clear, appropriate and realistic?
	3.2 How efficient and effective were the project's management arrangements? Were roles, responsibilities and accountabilities sufficiently clear?
	3.3 How effective were the project's monitoring processes?
	3.4 Was the originally anticipating co-financing secured?

Key evaluation questions	Guiding sub-questions
EFFECTIVENESS	
4. **Did the project achieve its planned outputs and outcomes?**	**4.1** What policies, incentives and technical standards were developed and adopted as a direct result of the project?
	4.2 To what extent and how were public and private institutional capacities developed as a direct result of the project?
	4.3 Were the piloted technologies, processes and business models technically viable, commercially attractive and contextually appropriate?
	4.4 To what extent did the project deliver increased awareness and knowledge of EV-RE integration? Did this promotion deliver increased support for EV-RE integration? Is there evidence of behaviour change amongst stakeholders?
IMPACT	
5. **How likely is it that the project's outputs and outcomes will contribute to long-term impacts?**	**5.1** What direct and indirect emissions reductions has the project delivered? How did these compare to the reductions envisaged at project design?
	5.2 Beyond the project pilots, has there been an increase in the deployment of EV-RE grid integration solutions? If so, to what extent has this improved the stability of the grid?
	5.3 Has there been an increase in the deployment of EV charging infrastructure directly supplied by RE micro-grids?
	5.4 To what extent has the project influenced national and city-level policy on EV-RE integration?
	5.5 To what extent has the project influenced business interest and commercial activity relating to EV-RE integration?
SUSTAINABILITY	
6. **To what extent are the project's outputs and outcomes likely to be sustained in the long term?**	**6.1** What are the key factors that will affect (negatively or positively) the sustainability and uptake of the project's results?
	6.2 To what extent has the project put in place a mechanism to support further changes through mainstreaming, replication and scaling-up of project contributions beyond the project duration?

Key evaluation questions	Guiding sub-questions
	6.3 What gaps and needs were not addressed by the project?
	6.4 How were gender dimensions incorporated within project design and delivery?

Annex 2: Persons interviewed

Project Oversight

Name	Organisation
Ahmed, Aymen	UNIDO
Barunica, Katarina	UNIDO
Dehod, Nicholas	UNIDO
Ghoneim, Rana	UNIDO
Jian, Ma	UNIDO
Onysko, Ganna	UNIDO
Schreck, Bettina	UNIDO
Thampi, Sharon	UNIDO

Project Delivery

Name	Organisation
Bing Wang	Qingdao TeLaiDian Co.
Chunmei Chen	MIIT
Fengchao Zhao	Shanghai International Automobile City (Group) Co.
Heyu Zhao	CSAE
Huiping Liu	Director of Green Transportation Special Committee of Shanghai Transportation Engineering Society (GEF6 Shanghai Demonstration Project Expert)
Ju Wang	CSAE
Li Qiao	Shanghai International Automobile City (Group) Co.
Lijin Zhao	CSAE
Liu Xiaotian	Qingdao TeLaiDian Co.
Mingcai Wang	State Grid Electric Vehicle Service Co. Ltd
Yali Zheng	CSAE
XiaoZhi Deng	CSAE

Others

Name	Organisation
Ming, Yang	GEF
Xiomei, Tan	GEF (Formerly)

Annex 3: Documents reviewed

Cenxuan, P. et al, [IANEV] Mid-Term Review, (2021), UNIDO

GEF Evaluation Policy, (2019), GEF

Guidelines for GEF Agencies in Conducting Terminal Evaluation for Full-sized Projects, (2017), GEF

[IANEV] Final Report, (2022), UNIDO

IANEV Monitoring Data and Documentation, (2022), Curated and provided by CSAE Beijing

[IANEV] Request for Project Endorsement/Approval, GEF Trust Fund Prodoc, (2017), UNIDO

Policy on Co-financing, (2018), GEF

Terms of Reference: Independent terminal evaluation Integrated adoption of New Energy Vehicles in China, (2022), UNIDO

UNIDO – China Energy Partnership, Promotional brochure, (2015), UNIDO

UNIDO Director General's Bulletin: Evaluation Policy, DGB/2021/11, (2021), UNIDO

UNIDO Independent Evaluation Division Evaluation Manual, (2019), UNIDO

Annex 4: IANEV self-reported monitoring data

Expected Result	Indicator	Baseline	Target	Results
Project Objective: Facilitation and scale-up of the integrated development of electric vehicles (EVs) with renewable energy (RE) in China	Direct GHG emissions reduced from integration of EVs with RE and from scale-up of EV use beyond business as usual, based on the project demos (t CO_2)	0	25,629	126,181
	Indirect GHG emissions reduced from integration of EVs with RE and from scale-up of EV use beyond business as usual, based on replication of the project demos (t CO_2)	0	62,181	2,008,653
	Amount of RE used to charge EVs in China via micro-grids and smart charging (both direct via project demos and indirect via replication of demos) (MWh)	0	69,465	Direct: 140,461 Indirect: 2,555,204
Outcome 1: Drafted and recommended policies, technical standards, and guidelines that provide regulatory and planning elements, leading to the higher adoption of EV-RE integration schemes by city governments, vehicle manufacturers, and consumers, thus resulting in GHG emission reductions	Number of incentive policies or amendments related to EV-RE integration approved or under current active review with high potential for approval at the ministerial level for entry into the policy pipeline. Such incentive policies may include those for: (a) smart charging, (b) V2G, (c) distributed RE for EV charging, (d) grid-based uptake of RE by EVs, and (e) secondary batteries	0	3	5
	Number of different types of standards adopted to facilitate EV-RE integration and scale-up (types to be selected from the following: energy management center standards, technical standards for V2G connection, standards for secondary use of retired EV batteries, technical and safety standards for smart charging systems, standards for mobile charging systems, and standards for distributed RE systems for charging EVs)	0	6	17

Expected Result	Indicator	Baseline	Target	Results
	Number of cities that have officially adopted local EV-RE integration and scale up plans	0	6	9
Output 1.1A: National level roadmap to facilitate effective EV-RE integration and scale up that achieves consensus among stakeholders	Number of key ministries providing input to *National Roadmap on EV-RE Integration*	0	3	4
Output 1.1B: Suggested policies and framework that promote balancing of grid load with power generated via utilization of EVs, thus providing a foundation for scale up of EV-RE integration	Number of different key topics covered by proposed policies or amendments submitted to government related to EVs' role in balancing power load with power supply (key topics for which coverage is to be assessed include: smart charging guidelines and incentives, energy management center set-up, V2G power sales to grid, and V2G incentives)	0	4	7
Output 1.1C: Proposed national-level policies to regulate and incentivize systems for the charging of EVs with RE, including those integrating either RE micro-grids or grid-based large-scale RE installations	Number of different key topics covered by proposed policies submitted to government related to EVs being charged with RE (key topics for which coverage is to be assessed include: guidelines for distributed EV-RE charging systems, incentives for distributed EV-RE charging systems, and incentives for grid-based EV smart charging using RE that would otherwise be curtailed)	0	3	3
Output 1.1D: Proposed national-level policy instruments to regulate and incentivize use of retired EV batteries, which may play a key role in large-scale EV-RE integration	Number of different key topics covered by proposed policies submitted to government related to use of secondary use of retired EV batteries (key topics for which coverage is to be assessed include: guidelines for use of retired EV batteries and incentives for use of retired batteries)	0	2	2
Output 1.2: Issuance of technical standards and specifications facilitating EV-RE integration and scale up, including those for smart	Number of different types of standards proposed by expert standards formulation committees to facilitate EV-RE integration and scale-up (types to be selected from the following: energy	0	6	17

Expected Result	Indicator	Baseline	Target	Results
charging systems, vehicle to grid (V2G) systems, mobile charging systems, and use of retired EV batteries	management center standards, technical standards for V2G connection, standards for secondary use of retired EV batteries, technical and safety standards for smart charging systems, standards for mobile charging systems, and standards for distributed RE systems for charging EVs)			
Output 1.3: Recommendations presented to transport sector authorities for incorporation of incentives for EV charging with RE in transport sector national carbon trading policies, including carbon trading rules for EVs powered by RE, to promote greater adoption of RE in the grids supplying electricity to EVs	Status of proposal to incorporate charging of EVs with RE into national carbon trading systems (1= submitted to government, 0=not yet submitted to government)	0	1	1
Output 1.4: City-level EV-RE integration and scale up plans, including replication plans for the adoption of best models demonstrated in Shanghai and Yancheng	Number of cities with draft local EV-RE integration and scale up plans	0	6	9
Output 1.5: Proposed institutional plan to establish responsibilities of and coordination among various government organizations for EV-RE integration	Number of different ministries reviewing institutional plan	0	3	4
Outcome 2: Increased institutional capabilities and awareness of policymakers at national and local levels on the use of integrated EV - SG (Smart Grid) - RE systems	Total number of policymakers reached by project's capacity building and awareness work regarding EV-RE integration	0	100	100+
	Total number of cities whose policymakers are reached by project's capacity building and awareness work regarding EV-RE integration	0	30	100+

Expected Result	Indicator	Baseline	Target	Results
	Number of cities that indicate they have a strong interest in learning more about and carrying out EV-RE integration work as a result of project outreach	0	10	13
Output 2.1: Training program for 100 city-level policy makers on EV-RE integration policies and demonstration experience	Number of government officials attending EV-RE integration training program that pass test on mastery of materials given at end of program Proportion of women among training program attendees	0 N/A	80 35%	100+ 35%
Output 2.2: Four workshops conducted to validate the EV-RE integration policy and planning framework	Number of workshops at which strong consensus is achieved for proposed policy, standards, trading system, or roadmap Proportion of women among attendees of all four policy and planning workshops	0 N/A	4 35%	6+ 35%
Output 2.3: International forums with participants from central government agencies and EV demonstration cities that disseminate international developments in and plans for EV-RE integration	Number of country case studies included in report on international developments in EV-RE integration Number of distinct Chinese government officials attending one or both of the two forums on international developments in EV-RE integration Proportion of women among all attendees of the international forums	0 0 N/A	5 30 35%	5 40+ ~43%
Output 2.4: Written materials on EV-RE integration strategically disseminated to policy makers	Number of government officials that are confirmed to have reviewed briefing materials Number of categories of items included in online information base (possible categories include: policy briefings, international study, demo reports, roadmaps, policies/ regulations, standards)	0 0	30 6	100+ 6

Expected Result	Indicator	Baseline	Target	Results
Outcome 3: Two city-scale projects piloted, demonstrating the integration of EVs and RE, as well as other foundational work needed to achieve large-scale EV-RE integration	Amount of renewable energy uptake by EVs in project demo micro-grids	0	2,101 MWh	2,674,899 MWh
	Amount of energy shifted by smart charging of project demos to reduce peaks and valleys of grid demand	0	20,075 MWh	31,084MWh
	Amount of energy stored and returned annually to micro-grids by retired EV battery banks	0	819,936 KWh	7,239,000kWh
Output 3.1: Demonstration of integration of EVs with the power grid, needed as basis for EVs eventually to address intermittency issues of large-scale RE power incorporation into the grid	Number of (a1) smart charging devices and (b) electric vehicles successfully participating in smart charging system in Yancheng, including: (b1) trucks, (b2) taxis, (b3) buses, (b4) fleet sedans, and (b5) private or rental sedans	(a1) 0 (b1) 0 (b2) 0 (b3) 0 (b4) 0 (b5) 0	(a1) 1,000 (b1) 700 (b2) 50 (b3) 10 (b4) 100 (b5) 140	1071 700 50 10 100 140
	Number of (a2) smart charging devices and (b) electric vehicles successfully participating on a daily basis in smart charging system in Shanghai, including: (b6) hourly car sharing sedans	(a2) 0 (b6) 0	(a2) 200 (b6) 200 (daily average)	876 250
Output 3.2A: Demonstration of integration of EVs into RE micro-grids, including demonstration of micro-grids incorporating wind, PV, use of retired EV batteries as storage, EVs, and buildings and a manufacturing facility	Number of EVs powered mainly by RE micro-grid demos in Yancheng	0	87	300+
	Number of EVs powered mainly by RE micro-grid demo in Shanghai	0		180+
Output 3.2B: Demonstration of V2G technologies and pilot commercial systems enabling EVs (or retired EV battery packs) to send power back to the micro-grid at times that it is needed	Number of electric vehicles successfully participating in demonstration of micro-grid connected V2G system in Qingdao	0	10	10
	Amount of energy sent to the grid via V2G of Qingdao micro-grid (kWh)	0	48,180 kWh	>50,000 kWh
	Number of electric vehicles successfully participating in demonstration of micro-grid connected V2G system in Shanghai	0	5	31

Expected Result	Indicator	Baseline	Target	Results
	Amount of energy sent to the grid via V2G of Shanghai micro-grid (kWh)	0	22,886 kWh	61,525kWh
Output 3.3A: Demonstration of greater density of the EV stationary charging network, thus serving as a basis for scale-up of EV-RE integration	Number of stationary EV charging poles of EVCARD business in Shanghai	4,000	16,000	74,839
Output 3.3B: Demonstration of alternatives to stationary charging stations, in particular mobile charging station vehicles, to deal with emergency needs for charging, thus increasing the feasibility of EV use and thereby supporting the scale-up of EV-RE integration	Mobile charging stations circulating on daily basis in Yancheng Total number of retired EV battery packs used on mobile charging stations on daily basis in Yancheng	0 0	3 36	3
Output 3.3C: Demonstration of business models to scale-up the number of EVs, thus laying the ground work to realize the benefits of EV-RE integration on substantial scale	Number of hourly car rental ("car sharing") passenger vehicles in Shanghai's EVCARD fleet Number of pure electric buses in E-drive's rental fleet	1,600 50	8,000 200	8000 250
Output 3.4: Demonstration of energy management centers that collect and manage data on dispersed EVs and retired EV battery packs used as storage for the grid, so that the charge and discharge of these devices can be managed	Number of vehicles receiving commands from Yancheng's energy management center on an ongoing basis that control their charging times (and discharging times, if relevant) including: (b1) trucks, (b2) taxis, (b3) buses, (b4) fleet sedans, and (b5) private or rental sedans (*Note: Likely to be similar to Yancheng indicator values for outcome 3.1A, except that 10 V2G vehicles are added*) Number of vehicles receiving commands from Shanghai's energy management center on an	(b1) 0 (b2) 0 (b3) 0 (b4) 0 (b5) 0	(b1) 700 (b2) 50 (b3) 10 (b4) 110 (b5) 140	Buses-258 in 120,174 times, 25,195 charging times for vehicles of enterprises and institutions Private vehicles:

Expected Result	Indicator	Baseline	Target	Results
	ongoing basis that control their charging times (and discharging times, if relevant), including: (b6) hourly car sharing sedans	(b6) 0	(b6) 205	385,210 times 250
Output 3.5A: Detailed monitoring and assessment of project demos of EV integration with the power grid	Number of areas in which EV integration with power grid demo data and information on experience is collected, assessed, and reported with recommendations. (Areas to be covered include: (1) smart charging and (2) energy management centers) Number of smart charging poles in Yancheng for which data is collected and assessed for 2 years Number of smart charging poles in Shanghai for which data is collected and assessed for 2 years	0 0 0	2 1,000 200	2 1071 876
Output 3.5B: Detailed monitoring and assessment of project demos of RE-EV micro-grids	Number of areas in which EV-RE micro-grid demo data and information on demo experience is collected, assessed, and reported with recommendations. (Areas to be covered include: (1) EV-RE micro-grid generally and (2) V2G in RE micro-grid) Number of regular micro-grid charging poles and number of V2G charging poles in Yancheng for which data is collected and assessed for 2 years (number of regular poles, number of V2G poles) Number of regular micro-grid charging poles and number of V2G charging poles in Shanghai for	0 regular: 0 V2G: 0 regular: 0	2 regular: 80 V2G: 10 regular: 85	2 80 15 Regular: 304

Expected Result	Indicator	Baseline	Target	Results
	which data is collected and assessed for 2 years (number of regular poles, number of V2G poles)	V2G: 0	V2G: 5	V2G：20
Output 3.5C: Detailed monitoring and assessment of aspects of project demos related to the use of retired EV batteries, including development of know-how with regard to use of retired EV batteries so that they can be leveraged as tools of EV-RE integration	Number of areas in which retired EV battery demo data and information on demo experience is collected, assessed, and reported with recommendations. (Areas to be covered include: (1) retired EV battery packs in RE micro-grid, (2) retired EV battery packs in mobile charging station vehicles, and (3) other testing of retired EV batteries)	0	3	3
	Number of retired EV battery packs utilized in the project demos for which data is included in the safety database and associated assessment	0	291	933
	Number of key technical topics covered in retired EV battery guidelines (possible key topics include: maintenance, repair, and refurbishment).	0	3	3
	Number of key battery chemistries covered in technical and economic evaluation of use of retired EV batteries	0	3	3
Output 3.5D: Detailed monitoring and assessment of aspects of project demos related to scale-up and increased concentration of China's EV fleet and charging infrastructure	Number of areas of scale-up and increased concentration in which demo data and information on demo experience is collected, assessed including business feasibility assessment, and reported with recommendations. (Areas and to be covered include: (1) mobile charging station vehicles generally (Yancheng), (2) increased density of network of stationary charging poles	0	4	4

Expected Result	Indicator	Baseline	Target	Results
	(Shanghai), (3) car sharing EV scale up (Shanghai), and (4) EV rental bus scale up (Shanghai)) Number of mobile charging stations for which general operational data is collected and assessed for 2 years	0	3	3
Outcome 4: Increased knowledge and capacity of business and consumer stakeholders, facilitating awareness, research and development, manufacture, operation, and maintenance with regard to EV-RE integration	Estimated number of consumers/ the public reached by all forms of project outreach on EV-RE integration	0	8 million	230,000+ 9,000+ 1,000+
	Estimated total number of companies reached by all forms of project outreach on EV-RE integration	0	60	300+
	Number of companies deciding to dedicate greater effort to the EV-RE area as a result of project outreach	0	15	32
Output 4.1A: Forums for industry, including both domestic and international players active in the China market in the vehicle, power, and other related sectors, on EV-RE business models, technology, and demonstration results	Number of distinct industrial companies related to EVs, power, or RE attending at least one of project's forums Proportion of attendees at forums for industry that are women	0 N/A	30 35%	30+ ~35%
Output 4.1B: Dissemination to industry of project's EV-RE information base	Number of industrial organizations that receive project's EV-RE information base materials and find them useful in their business plans	0	10	10
Output 4.1C: Meetings publicizing EV-RE related technical standards, held for vehicle OEMs, charging equipment suppliers, and other related industrial companies	Number of persons attending meetings that do well enough on end of meeting test to confirm acceptable grasp of materials presented Proportion of attendees at standards meetings that are women	0 N/A	60 35%	120 35%
Output 4.1D: Technical operation and maintenance workshops related to EV-RE integration	Number of persons attending meetings that do well enough on end of meeting test to confirm acceptable grasp of materials presented.	0	50	130

Expected Result	Indicator	Baseline	Target	Results
aspects held for relevant industrial organizations	Proportion of women attendees at O&M workshops	N/A	35%	35%
Output 4.1E: Establishment of industry alliance or association subcommittee for promoting and advancing EV-RE integration and liaising with government on EV-RE integration policy	Number of distinct companies that join the industry alliance set up by the project to advance EV-RE integration	0	12	33
Output 4.2: Awareness raised among current and future potential car sharing companies of various car sharing business models and integration of EVs with RE in car sharing businesses	Number of existing car sharing business entities participating in project exchange workshop	0	15	15+
	Number of entities interested in newly entering the car sharing business participating in project exchange workshop	0	15	15
Output 4.3A: Media promotion of EV-RE integration, raising awareness of the public regarding the need to incorporate RE into EV development to realize the environmental potential of EVs and educating the public on various aspects of EV-RE integration	Number of viewers of documentary film on EV-RE integration	0	50,000	500,000+
	Number of news articles (print media or online news) in Chinese press on EV-RE integration	0	30	130+
	Number of radio listeners exposed to EV-RE integration via project's radio campaign	0	1 million	>1,000,000
	Number of special strategies or measures adopted in media EV-RE integration outreach that specifically target the interests and concerns of women	0	3	3
Output 4.3B: Promotion of EV-RE integration to consumers via social organizations, increasing consumers' understanding of and attraction to the concept and related opportunities	Increase in membership of EV clubs targeted by project (number of new members)	0	200	10,489
	Number of persons exposed to EV-RE integration concepts via EV social clubs	0	500	10,000+

Expected Result	Indicator	Baseline	Target	Results
	Number of women's organizations and number of women reached by project's special outreach to women's organizations to promote EV-RE to them	0 organizations 0 women	8 organizations 400 women	400+
Output 4.3C: Outreach on social media platforms and cooperation with social media companies to carry out promotion of EV-RE integration	Number of social media platforms on which the project's social media outreach campaign generates ongoing discussion regarding EV-RE integration	0	3	3
	Number of special strategies or measures adopted in social media EV-RE integration outreach that specifically target the interests and concerns of women	0	2	2
Output 4.4: An EV-RE integration demonstration center in Yancheng, created to raise awareness on the topic of EV-RE integration amongst consumers, companies using EVs, and industries related to RE or EV	Number of Chinese government officials that have visited EV-RE integration demonstration center in Yancheng	0	200	200+
	Total number of persons that have visited EV-RE integration demonstration center in Yancheng	0	2,000	2,000+
Environmental and Social Management Plan (ESMP) indicators not included elsewhere	Proportion of international consultant person days performed by women	N/A	35%	>35%
	Proportion of domestic consultant person days performed by women	N/A	35%	43%
	Proportion of new or upgraded charging poles in project demos that are monitored for safety in construction and operation.	N/A	100%	100%
	Number of incidents of noncompliance with safety standards in construction or number of safety incidents with regard to project's charging poles or EV-RE mini-grids	N/A	0	0
	Number of battery packs or batteries that are part of project that are not disposed of properly	N/A	0	0