

RESEARCH ARTICLE

Explicitation in the Translation of Sci-tech Texts: A Case Study of Articles on IEA and the Chinese Government Official Websites

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Abstract:

In the context of scientific and technological globalization, accurate and efficient translation of sci-tech texts is of paramount importance. Employing a qualitative case study methodology, this research investigates the application of explicitation strategies in translation using seven energy-related documents (2019-2022) from the International Energy Agency (IEA) and the Chinese government websites. These documents are selected for their high relevance to contemporary energy policy discourse and manifestation of typical genre features. Drawing upon principles from contrastive analysis and explicitation theory, the research examines translation practices at lexical, syntactic, and discourse levels to elucidate how translators render implicit information explicit, thereby enhancing translational clarity and accuracy. Analysis reveals that specific strategies are employed: at the lexical level, annotation and contextual adaptation clarify specialized terminology; at the syntactic level, structural transformation and clause adaptation bridge structural divergences between English and Chinese; and at the discourse level, logic explicitation and adjustments in cohesion (omission/addition) address coherence gaps. The research finds that the appropriate application of these explicitation strategies significantly improves translation quality by ensuring terminological precision, resolving structural ambiguities, and clarifying logical connections for target readers. These improvements contribute to reducing the cognitive load for target readers by aligning translations with their linguistic expectations, thereby promoting more effective international sci-tech exchange and cooperation. Acknowledging the limitations inherent in the small sample size of this study, we recommend expanding the corpus to other sci-tech fields for future research. Such expansion would provide more targeted and extensive theoretical and practical guidance for the translation of diverse scientific texts, ultimately promoting global sci-tech knowledge exchange and collaborative development.

Keywords: sci-tech text, explicitation, case study

1. Introduction

In the context of accelerating global efforts toward energy transition and carbon neutrality, the accurate and effective translation of energy-related sci-tech texts between English and Chinese assumes critical importance. Since China announced its ambitious “Dual Carbon” targets (peaking emissions before 2030, and achieving neutrality before 2060) in 2020, its renewable energy sector has rapidly advanced, positioning the nation, alongside international initiatives like the EU Green New Deal and the US Inflation Reduction Act, at the forefront of the global energy transformation. Texts detailing these developments, originating from sources like the International Energy Agency (IEA) and



government bodies, are vital for international policy understanding, technological collaboration, and knowledge dissemination. However, their translation presents specific challenges that can impede effective cross-lingual communication. Notably, energy sci-tech texts are characterized by distinctive genre features, including a high density of specialized and rapidly evolving terminology (e.g., “net-zero emissions,” “CCUS,” “Sustainable Development Scenario”), complex syntactic structures often reflecting intricate policy details or technical processes, and reliance on implicit contextual or cultural knowledge that may not be shared between source and target audiences. Misinterpretations or ambiguities arising from these challenges – such as literally translating “碳排放空间” (*tan paifang kongjian*) as “carbon space” – can hinder mutual understanding and cooperation in this crucial global sector.

While translation strategies, including explicitation – the process of making implicit information in the source text explicit in the target text (Vinay & Darbelnet, 1995; Blum-Kulka, 2004) – have been widely studied, their specific application within the contemporary English-Chinese energy domain requires further investigation. Existing research often focuses on explicitation in literary or general texts, or examines specific linguistic levels in isolation. However, few studies systematically analyze how explicitation strategies are applied concurrently across lexical, syntactic, and discourse levels when translating the high-stakes energy policy and technology documents between English and Chinese. In particular, a comparative analysis of these strategies applied to the texts from official sources, such as the IEA versus national government bodies, warrants further investigation. Significant disparities between English (hypotaxis) and Chinese (parataxis) in syntactic structure and discourse logic (explicit vs. implicit) further compound these challenges, often requiring transformations beyond literal rendering.

This research aims to address this gap through a multi-level analysis of explicitation in practice. By analyzing seven representative energy-related articles (three in English, four in Chinese) from IEA and the Chinese government websites (2019-2022) – texts focusing on renewable/fossil fuel trajectories, technological breakthroughs, and policy coordination – it investigates the practical application of explicitation strategies across lexical, syntactic, and discourse levels. In contrast to those studies that examine explicitation primarily in literary or general texts, or those at individual linguistic level, this research focuses specifically on identifying and evaluating the techniques translators employ to navigate the terminological (e.g., using term banks, annotation), structural (e.g., clause reorganization for embedded clauses or run-on sentences), and coherence challenges (e.g., adding logical conjunctions) inherent in this genre and language pair. The unique contribution of this research lies in its integrated approach, which examines how different types of explicitation strategies operate and interact at lexical, syntactic, and discourse levels. The examination was conducted to texts from comparable official sources of the high-impact energy field, thereby moving beyond analysis solely on isolated linguistic features. The objective is to provide a nuanced understanding of how explicitation contributes to enhancing clarity, accuracy, and readability in this specific context, thereby fostering international comprehension and providing linguistic support for transnational technological collaboration and climate governance.



2. Current Status of Explicitation Research in China

As a translation strategy, explicitation refers to the phenomenon where translators enhance the clarity and comprehensibility of the target text by supplementing information or adjusting expressions during the translation process. This strategy was initially proposed by French scholars Vinay and Darbelnet (1995) and subsequently developed by Blum-Kulka (2004) into the Explicitation Hypothesis. This theory posits that translated texts tend to be more explicit and longer than their source texts. Explicitation is not merely a linguistic conversion method, but also a manifestation of translation nature, exhibiting distinct forms and applications across various text types, including legal documents, literary works, and sci-tech literature.

Since the reform and opening-up strategy was carried out in 1978 in China, the domestic research on Western translation theories has progressed through four phases: initial introduction (1978-1988), comprehensive exploration (1989-1999), digestion and absorption (2000-2010), and integration and innovation (2011-present) (Yi & Liu, 2024). Generally speaking, research on Western translation theories in China appears in various formats, including journal articles, monographs, translated works, and textbooks. However, this study exclusively focuses on journal articles. To systematically investigate the latter three phases, this study utilized the advanced search function of the China National Knowledge Infrastructure (CNKI) database. The search terms “显性翻译策略” (*xianxing fanyi celue*, namely “explicit translation strategy”), “明晰化翻译” (*mingxihua fanyi*, namely “explicitation translation”), and “明晰化翻译策略” (*mingxihua fanyi celue*, namely “explicitation translation strategy”) were used, and the publication date was set as “1990-2024”. To ensure data quality, the research further narrowed its scope to three core Chinese academic indices: Peking University Core Journals (PKU Core), Chinese Social Sciences Citation Index (CSSCI), and Chinese Science Citation Database (CSCD). A total of 173 records were retrieved, and after manual screening and data cleaning, 163 valid articles were retained. To map the disciplinary focus of this research, CNKI’s visualization tools were used to generate an interdisciplinary distribution map (Figure 1).

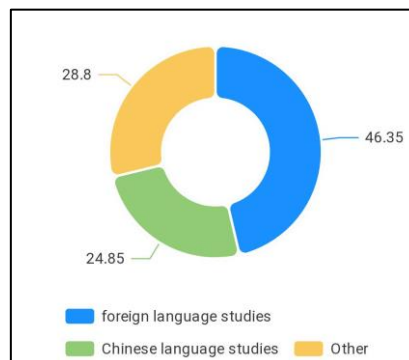


Figure 1. Disciplinary Distribution of Explicitation Translation Strategy (unit: %)

A preliminary analysis involved mapping the disciplinary distribution of these retrieved articles. Figure 1 illustrates the disciplinary distribution of the retrieved articles on explicitation, categorized based on CNKI journal classifications. This visualization reveals that the vast majority of research originates from journals classified under “Foreign Language Studies” and “Linguistics.” Specifically, publications in foreign language journals constitute the largest share, with a smaller representation from fields like “Chinese Language Studies” and others. This distribution highlights the primary

academic contexts where explicitation is discussed, indicating that it is predominantly framed as a linguistic and foreign language teaching/learning issue, rather than being extensively explored within specialized domains like science and technology translation. This initial mapping underscores the disciplinary concentration and potential areas where research might be underdeveloped.

To further probe the specific areas and thematic evolution within this body of research, the author employed bibliometric analysis using CiteSpace software (Li & Chen, 2022). CiteSpace allows for the visualization and analysis of networks derived from scientific publications, identifying key research fronts, influential authors, and pivotal keywords based on co-occurrence frequency and centrality metrics (such as betweenness centrality, which indicates a node's importance in connecting different parts of the network). The research analyzed the keywords associated with the retrieved articles published between 1990 and 2024, to identify the most prominent themes and research hotspots. It demonstrates significant technical and functional strengths in constructing knowledge maps of disciplinary development and performing visual analytics. Additionally, it supports the analysis and prediction of disciplinary hotspots, relevant evolutionary trajectories, and emerging research frontiers and trends (Li, 2014).

During the data processing, CiteSpace 6.4.R1 (Advanced Edition) was applied to import the 163 article records (including titles, authors, keywords, and abstracts) in plain text format (txt.). Parameters were configured as follows:

- Time Slicing & Years Per Slice: 1990-2024 & 1, divided into 34 one-year intervals.
- Node Types: Keywords.
- Thresholds: Top $N=50$, via the g-index algorithm, which means selecting the top 50 levels of most cited or occurred items from each slice.
- Link Strength: Calculated using the Cosine algorithm.
- Pruning: Pathfinder network.

Keywords, as condensed representations of research themes, reveal hotspots, trends, and thematic relationships within a field (Luo et al., 2021). For the selected articles, CiteSpace was employed to conduct high-frequency keyword analysis, generating a keyword co-occurrence map (Figure 2) with 291 nodes, 104 links, a node density of 0.0025, and a modularity Q-value of 0.7021, indicating robust clustering effect, visualizing research trends in explicitation from 1990 to 2024. (“Q-value” is a critical metric for evaluating clustering quality and modularity. A Q-value exceeding 0.3 typically indicates a robust clustering effect.)



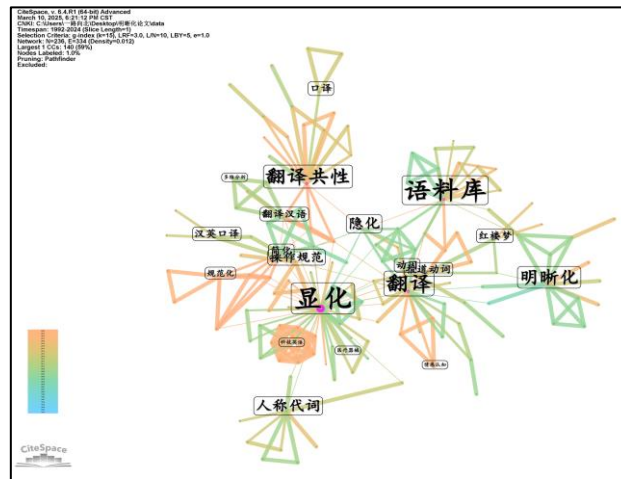


Figure 2. Keyword Co-occurrence Map in Explicitation Translation Strategy Research (1990-2024)

The analysis identified five dominant keyword nodes: “显化” (*xianhua*, namely “explicitness”), “语料库” (*yuliaoku*, namely “corpus”), “翻译” (*fanyi*, namely “translation”), “明晰化” (*mingxihua*, namely “explicitation”), and “翻译共性” (*fanyi gongxing*, namely “translation universals”). These terms occupy central positions in the network, radiating extensive connections to secondary nodes such as “人称代词” (*rencheng daici*, namely “personal pronouns”), “红楼梦” (*hongloumeng*, namely “Red Chamber Dream”), “操作规范” (*caozuo guifan*, namely “operational norms”), and “隐化” (*yinhua*, namely “implicitness”), forming a complex structural framework. This interconnectedness underscores the maturity of the explicitation strategy research and its established theoretical underpinnings.

A closer examination of the high-frequency and high-centrality keywords presented in Table 1 reveals significant trends of explicitation research in China. Unsurprisingly, “explicitation” itself ranks highly, confirming the core subject of the surveyed literature. Beyond this, several key thematic clusters emerge. Generally speaking, the betweenness centrality of keywords can reflect the degree of influence of literature in a research field. The higher the value, the stronger the influence. It is generally believed that a node with betweenness centrality greater than 0.1 is a key node (Han et al., 2016).



Table 1. High-Frequency Keywords in Explication Translation Strategy Literature (Top 20)

No.	Frequency	Centrality	Keywords	Year	No.	Frequency	Centrality	Keywords	Year
1	42	0.52	explicitness	2005	11	4	0.06	operational norms	2012
2	35	0.25	corpus	2006	12	4	0.08	translation strategy	2010
3	20	0.24	translation	2003	13	3	0.12	default	2006
4	17	0.2	translation universals	2006	14	3	0.01	simplification	2007
5	11	0.48	implicitness	2005	15	3	0.03	translation style	2019
6	10	0.2	explication	2003	16	3	0.06	reporting verbs	2010
7	6	0.07	translated Chinese	2008	17	3	0.03	Chinese-English interpretation	2012
8	6	0.07	personal pronoun	2009	18	3	0.05	motivation	2008
9	4	0.03	translation teaching	2006	19	3	0.02	interpreting	2012
10	4	0.05	Red Chamber Dream	2010	20	3	0.02	translation research	2008

The prominence of “corpus” as a high-frequency and central keyword is particularly noteworthy. This strongly suggests that corpus-based methodologies have become a dominant paradigm for investigating explication in the Chinese context. Researchers frequently utilize parallel or comparable corpora to quantitatively and qualitatively compare source texts and target texts, identifying patterns of explication across various linguistic levels (lexical, syntactic, and discourse) (Hu, 2010; Qin & Wang, 2009). The reliance on corpora reflects a broader trend in translation studies globally, emphasizing empirical data and descriptive approaches. This methodological focus, while valuable for uncovering patterns, might also shape the types of research questions asked and the texts selected for analysis.

Another significant cluster revolves around “translated Chinese” (or similar terms like “translationese”). The frequent appearance of this keyword indicates a strong interest among Chinese scholars in the linguistic features that characterize translated texts in Chinese, often in contrast to non-translated Chinese (Wang, 2001). Explication is frequently studied as one potential feature contributing to the distinctiveness of “translated Chinese,” possibly linked to concepts like “translation universals” (another recurring keyword, though sometimes debated) or interference from the source language (often English, as suggested by the keyword “English-Chinese translation”) (Huang & Li, 2010). This line of inquiry focuses on the general linguistic properties of translation output.

Furthermore, the keyword analysis highlights a distinct focus on literary translation. The high rank of “Red Chamber Dream” (*Hong Lou Meng*), a canonical work of Chinese literature, is particularly telling. Its frequent appearance signifies that studies often use this classic novel and its various translations (primarily into English) as a case study for examining explication and other translation phenomena (Liu, 2005; Sun & Li, 2009). While valuable for understanding the nuances of literary translation, the emphasis on such texts suggests a potential skew in the research landscape. Similarly, keywords like “personal pronoun” and “cohesion” point toward investigations into specific linguistic features, often analyzed within literary or general text types where stylistic and cohesive shifts are



prominent areas of interest. The research of explicitation in relation to specific grammatical categories or discourse features is clearly a well-established research avenue.

However, what is equally revealing is the absence of certain keywords within the high-frequency and high-centrality list. The prominence of keywords related to literary translation (e.g., “Red Chamber Dream”), general linguistic features (e.g., “personal pronoun,” “translated Chinese,” “corpus”), coupled with the notable absence of terms related to scientific or technical translation (e.g., “sci-tech translation,” “technical terminology,” “patent translation,” “medical translation,” “energy text”) in the high-frequency/centrality list, suggests that research on explicitation in specialized, non-literary domains is significantly less prevalent in the surveyed body of literature. While some studies might touch upon non-literary texts, the core focus, as indicated by the most influential keywords, leans heavily toward literary works and general linguistic comparisons. While corpus methods and literary analysis are valuable, the specific challenges of sci-tech translation – such as ensuring terminological precision, conveying complex conceptual relationships accurately, and adhering to strict genre conventions for clarity and objectivity (Wright & Wright, 1993) – may require different analytical foci and potentially different applications of explicitation. The observed focus on general linguistic features or literary style might not fully address the unique demands posed by translating dense, information-rich sci-tech content.

This apparent neglect points toward a critical research gap. Scientific and technical translation plays an increasingly vital role in global knowledge dissemination and collaboration, particularly in fields like energy. Understanding how explicitation operates specifically within sci-tech genres is crucial for improving translation quality and facilitating effective communication. Despite its importance, the analysis suggests this specific domain has received comparatively less attention within the explicitation research landscape in China. The unique challenges of explicitation in sci-tech translation remain relatively underexplored in the Chinese context. This research aims to fill this gap by focusing specifically on explicitation in translating energy-related sci-tech texts between English and Chinese, and provide insights into how translators navigate the complexities of this specific genre and language pair.

3. Case Analysis

The research employs a qualitative case study approach. Seven representative articles concerning energy policy and technology (published 2019-2022) were selected from the official websites of the IEA and the Chinese government (National Energy Administration, Ministry of Ecology and Environment, etc.). Selection criteria included: relevance to key contemporary energy topics (e.g., coal transition, hydrogen, net-zero goals), publication date alignment, and availability in both English and Chinese versions (allowing for bidirectional analysis, though the examples presented focus on specific directions for illustrative purposes). While this small corpus limits generalizability, these texts were chosen as illustrative examples because they exhibit typical characteristics of official sci-tech literature in this field, such as formal register, high information density, specialized terminology, and complex sentence structures detailing policies or technical assessments (Bhatia, 1993; Wright & Wright, 1993). Although sourced from different types of organizations (international vs. national), the texts share core genre features and a similar communicative purpose – disseminating official energy information – making them comparable for the specific purpose of this exploratory case study focused on identifying



explicitation strategies across related official sources. The analysis involved close reading and comparison of source and target text segments to identify instances where explicitation strategies were applied at lexical, syntactic, and discourse levels, drawing on principles of contrastive linguistics and explicitation theory.

During the translation of the seven selected articles from English to Chinese and vice versa, it became evident that challenges arose at multiple linguistic levels. Lexical terminology, syntactic structures, and discourse coherence each required distinct translation strategies, often involving explicitation, to navigate the complexities inherent in specialized sci-tech texts and the typological differences between English and Chinese. The following sections elaborate on the application of explicitation techniques at these three levels, providing specific examples and grounding the analysis in relevant linguistic and translation theories.

3.1 Lexical level

Given the specialized nature of the sci-tech texts concerning energy and climate change, the frequent occurrence of technical terminology, acronyms, and culturally specific policy names presents significant comprehension barriers for readers lacking domain-specific knowledge. To ensure contextual appropriateness, semantic accuracy, and clarity for the target audience, three primary explicitation methods were employed at the lexical level: annotation, contextual adaptation, and addition.

3.1.1 Annotation

The corpus contains numerous proper nouns and culture-specific terms, such as energy-related jargon (e.g., CCUS hubs), project names (e.g., Northern Lights), and policy initiatives (e.g., Sustainable Development Scenario). A direct translation of these terms, even if accurate, often risks semantic ambiguity or insufficient context for target readers who may lack the necessary background knowledge. As Newmark (1988) highlights, annotations (translator's notes) are a crucial strategy for clarifying cultural discrepancies, technical nuances, or potentially polysemous terms, thereby enhancing textual clarity and informational completeness without disrupting the flow of the main text.

Example 1

Source Text: Global hydrogen uses in the *Sustainable Development Scenario*¹ increases sevenfold to 520 megatons (Mt) by 2070.

Target Text: 在“可持续发展情景”¹中，全球氢气消费量到 2070 年将增长 7 倍，达 520 兆吨。

Analysis: The term “Sustainable Development Scenario” (“可持续发展情景”) refers to a specific, complex strategic framework established by the IEA. While the literal translation is understandable, it lacks the crucial contextual information about its origin (IEA), timeframe (2020), and core objective (achieving Paris Agreement goals for net-zero emissions by 2070). Integrating this extensive detail directly into the translated sentence would disrupt its

¹ Sustainable Development Scenario: “可持续发展情景”由国际能源署 (IEA) 于 2020 年设定，其目标是按照《巴黎协定》，在 2070 年实现与全球能源使用相关的 CO₂ 排放为零。



coherence and readability. Therefore, using an annotation ① serves as an effective explicitation technique. It makes the implicit background knowledge explicit for the target reader, ensuring they fully grasp the significance of this scenario within the discourse on climate action, without overburdening the main text (Newmark, 1988).

Example 2

Source Text: Norway's *Northern Lights project*², a large offshore CO₂ storage facility in the North Sea, could provide a solution for emissions from neighboring countries.

Target Text: 挪威的“*北极光*”项目² (Northern Lights project) 便是其中一个。该项目将在北海地区建造一个大型海上二氧化碳储存设施，可帮助邻国解决碳排放问题。

Analysis: This example appears in a context discussing the global development of over 12 Carbon Capture, Utilization, and Storage (CCUS) hubs. Highlighting Norway's project as a representative case necessitates clarification beyond just its name and basic function (offshore storage). The target reader likely lacks specific knowledge about this particular project's unique status (first open-source network), key partners (Equinor, Shell, Total), and operational details. Translating the project name alone would be insufficient. The annotation ② explicates this vital contextual information, addressing the reader's potential knowledge gap and facilitating a deeper understanding of its relevance as a pioneering CCUS initiative. This aligns with the principle of providing necessary background information to ensure communicative success in specialized domains (Hatim & Mason, 1990).

3.1.2 Contextual adaptation

Lexical meaning is often context-dependent. As Halliday and Hasan (1976) state regarding cohesive relations, the meaning of an item can be identified by reference to its textual or situational context. Due to typological differences and varying conventions between English and Chinese, a literal translation of certain terms might be semantically inaccurate, ambiguous, or stylistically inappropriate in the target context. Contextual adaptation involves selecting a target language expression that precisely conveys the intended meaning of the source term within its specific context, sometimes making implicit semantic features explicit.

Example 3

Source Text: These are the sectors where CCUS technologies are critical for tackling emissions because of a lack of *alternatives*.

Target Text: 由于这些领域缺乏 *其他减排措施*，CCUS 技术对其实现减排至关重要。

Analysis: The English word “alternatives” has a general meaning of “substitutes” or “other choices” (替代品). However, the preceding context discusses the difficulty of reducing emissions in specific industries like steel and cement. Therefore, the implicit meaning of

² Northern Lights Project: 由挪威发起，于 2025 年初启动，将成为第一个开源二氧化碳运输和封存网络，由 Equinor、壳牌和道达尔共同创建的合资企业，计划将二氧化碳运输到挪威西海岸的一个陆上终端，然后从那里通过管道将液化二氧化碳运输到北海的一个水下存储地点。



“alternatives” here is not just any substitute, but specifically alternative ways to reduce emissions. A literal translation like “替代品” could mislead the Chinese reader into thinking about alternative products or processes in general. The translator adapts the term to “其他减排措施” (“other emission reduction measures”). This is an instance of explicitation through contextual adaptation because it makes the specific type of alternative (related to emission reduction), which is implicit in the English source text’s context, explicit in the Chinese target text, ensuring semantic precision and relevance within the discourse on decarbonization strategies.

Example 4

Source Text: Moving the net-zero goalposts from 2070 to 2050 would require almost 50% more CCUS *deployment*.

Target Text: 如果净零排放实现年份从 2070 年推前至 2050 年, 那么 CCUS 技术的设施修建数量就需要在现有基础上增加近 50%。

Analysis: The term “deployment” often relates to strategic allocation, particularly in military contexts in Chinese (“部署”). A literal translation like “部署量” (“deployment volume”) would sound incongruous in this technical energy context. The surrounding text focuses on the need to scale up CCUS infrastructure to meet more ambitious climate targets. Analyzing this context, the translator interprets “deployment” not just as allocation, but as the physical implementation and construction of CCUS facilities. The adapted translation “设施修建数量” (“the number of facilities to be built”) makes this specific, concrete meaning explicit. It transforms the somewhat abstract English noun into a more tangible and contextually appropriate expression in Chinese, aligning with the practical focus of the sci-tech discussion and preferred Chinese lexical norms in this domain.

3.1.3 Addition

Due to differing linguistic conventions and potential knowledge gaps between source and target readers, translators sometimes need to add information that is implicitly understood by source text readers but might be obscure to target readers. Ke (2005, p. 306) notes that translators must sometimes “incorporate explicit expressions that aid target readers’ comprehension or render implicit source text information explicit.” This often involves adding classifiers, explanations, or standard technical equivalents.

Example 5

Source Text: 留给人类的排放空间和减排时间窗口已经很小, 任务紧迫。

Target Text: That means there are few *carbon budgets* for emissions, and a shorter time limit for emission reduction.

Analysis: A literal translation of “排放空间” (“emission space”) into English could be confusing, as “space” typically implies a physical dimension, potentially clashing with the abstract concept of emission limits. While understandable to Chinese readers familiar with climate discourse, the term lacks a standard, unambiguous equivalent in English general usage.



Through analysis of parallel texts and established terminology in international climate policy from the IPCC or World Resources Institute, the translator identifies “carbon budget” as the precise and widely accepted English term for the concept of the maximum allowable cumulative emissions to stay within a certain temperature target. By adding the established technical term “carbon budgets,” the translation makes the specific, technical meaning, which is implicitly understood within the Chinese context, explicit and standardized for the English-speaking audience. This explicitation through terminological addition enhances clarity, professionalism, and aligns the text with international discourse conventions (Ke, 2005).

3.2 Syntactic level

Significant typological differences exist between English and Chinese syntax. English generally favors hypotaxis, characterized by complex sentence structures with multiple levels of subordination, often using conjunctions, relative pronouns, and non-finite clauses to create intricate “tree-like” structures centered around a main subject-predicate core (Pan & Hu, 2008). Conversely, Chinese typically favors parataxis, often linking clauses with minimal overt conjunctions, relying more on semantic coherence, chronological sequencing, or topic-comment structures, resulting in more linear, “bamboo-like” sentences (Wang, 1984; Li, 2009). As Li (2009) notes, Chinese often chains verbs or clauses in temporal or logical order.

Translating between these distinct syntactic systems requires careful management. Directly mapping English hypotaxis onto Chinese or Chinese parataxis onto English can lead to grammatically awkward, stylistically unnatural, or cognitively burdensome sentences for the target reader. Explicitation at the syntactic level often involves adapting clause structures, transforming sentence architecture, or segmenting/reorganizing sentences to align with target language norms while preserving the source text's informational content and logical flow.

3.2.1 Clause adaptation

Sci-tech texts frequently utilize complex clausal structures (e.g., embedded clauses in English, clause chains in Chinese). Translation often requires adapting these structures to fit the syntactic preferences of the target language. Ye (2008) emphasizes that flexibility and adaptation are key to bridging linguistic disparities in translation. This may involve changing clause types, adjusting their order, or making implicit logical links between them explicit.

Example 6

Source Text: China accounted for 85% of the global growth in coal consumption, *which* it needed to power its rapidly growing industrial economy and build its infrastructure.

Target Text: 由于当时中国工业经济快速增长、基础设施兴建都需大量煤炭支撑，其煤炭消费量占全球总量达到了 85%。

Analysis: The English source text uses a non-restrictive relative clause introduced by “which” to provide the reason for China’s high coal consumption. The main clause (“China accounted...”) presents the primary information or result first. This reflects English’s tendency toward subject-prominence and “right-balancing,” where the main information often precedes



subordinate or modifying elements (Tai, 1985). Chinese, in contrast, often exhibits topic-prominence and “left-balancing,” preferring to establish the context, condition, or cause before presenting the main result or comment (Lian, 2013; Tai, 1985). The translator adapts the structure by converting the relative clause into an initial causal clause introduced by “由于” (“because/due to”) and placing the main result (“其煤炭消费量.....达到了 85%”) at the end. This explicitation involves not only adding the causal conjunction “由于” but also restructuring the sentence to follow a cause-effect sequence preferred in Chinese syntax, aligning with the reader’s cognitive processing expectations (Lian, 2013).

Example 7

Source Text: 智能化、互联网、大数据、云计算等新技术的出现，将融通电力网、热力网、交通网，形成能源互联网，助力新能源，提升能源配置效率，实现能源体系从量变到质变。

Target Text: Driven by the emergence of new technologies such as artificial intelligence, the internet, big data, and cloud computing, an energy internet will be formed that integrates the power grid, thermal network, and transportation network. This integrated system will subsequently support the development of new energy sources, improve energy allocation efficiency, and enable a qualitative transformation of the overall energy system.

Analysis: The original Chinese sentence employs a paratactic structure, chaining multiple verb phrases (融通....., 形成....., 助力....., 提升....., 实现.....) to describe the sequential functions and outcomes related to the central concept “能源互联网” (energy internet). This reflects the “bamboo-like,” clause-chaining structure common in Chinese (Li, 2009; Wang, 1984). A direct, literal translation into English would likely result in a lengthy and potentially cumbersome run-on sentence, violating English hypotactic preferences for clearer hierarchical structures. The translator adapts the clause structure significantly. First, the causal relationship between the emergence of new technologies and the formation of the energy internet, which is implicit in the Chinese word order, is made explicit by placing the “Driven by...” phrase at the beginning of the sentence. Second, the core concept “能源互联网” is established as the subject of the main clause (“an energy internet will be formed”). The function of integrating various networks (“融通.....”) is explicitly linked using a relative clause (“that integrates.....”). Third, the subsequent functions/outcomes (助力....., 提升....., 实现.....) are presented in a separate sentence, introduced by the explicit cohesive phrase “This integrated system will subsequently...”, clearly linking back to the energy internet and signaling the ensuing results. The potentially awkward direct translation of “从量变到质变” is adapted to the more standard English phrase “a qualitative transformation.” This comprehensive clause adaptation involves segmentation, reordering, adding explicit logical markers (“Driven by...”, “that integrates...”, “This integrated system will subsequently...”), and lexical adaptation (“qualitative transformation”) to create a syntactically coherent and stylistically appropriate translation that aligns with English hypotactic norms and enhances clarity for the target reader (Ye, 2008).



3.2.2 Structural transformation

Beyond clause adaptation, broader sentence structures often require transformation to bridge the gap between English and Chinese syntactic preferences. As Lian (2013) highlights, the paratactic nature of Chinese, emphasizing implicit coherence and functional sequencing, contrasts sharply with English hypotaxis. Translators should respect these structural divergences, adjusting sentence architecture – such as handling parenthetical elements or merging/splitting sentences – to ensure naturalness and clarity in the target language.

Example 8

Source Text: From today’s perspective – *as efforts increase around the world to accelerate clean energy transitions and reduce emissions from carbon-intensive fuels like coal* – the past ten years look like a period in which global coal demand remained stubbornly high.

Target Text: 当前世界各国正不断加码，加快向清洁能源转型，并降低煤炭等高碳化石能源碳排放。今天看来，过去十年似乎是全球煤炭需求高企不下的十年。

Analysis: The English original uses dashes to embed a lengthy parenthetical clause providing background context. This is a common feature of English hypotaxis, allowing writers to insert related but syntactically subordinate information within the main clause. A literal translation preserving the dashes and the embedded structure would be highly atypical and potentially disruptive to the flow in Chinese, which prefers more linear sequencing (Wang, 1984). The translator transforms the structure by extracting the parenthetical information and presenting it as a separate, introductory sentence. This establishes the background context first, followed by the main observation (“今天看来……”), adhering to the preferred information structure and the paratactic tendency of Chinese, thus enhancing readability for the target audience.

Example 9

Source Text: *In 2009*, coal’s share in the US power mix was 45%, with gas at 23%. *By 2019*, coal’s share had fallen to 24%, while gas now accounted for 38% of power generation.

Target Text: 2009 年至 2019 年间，煤炭占美国国内发电能源结构的比重从 45% 下跌至 24%，而天然气的比重却由 2009 年的 23% 跃增至目前的 38%。

Analysis: The source text presents two parallel simple sentences, each describing the situation at a specific point in time (2009 and 2019). While translating them as two separate sentences is possible, Chinese often favors conciseness and integrating closely related information (Pan & Hu, 2008). The translator transforms the structure by merging the two sentences into a single, more complex sentence. This is achieved by explicitly stating the time frame upfront: “2009 年至 2019 年间” (“Between 2009 and 2019”), making the duration explicit. The contrasting trends for coal and gas are then presented using conjunctions like “而” (“while/whereas”). This structural transformation results in a more concise and integrated expression that aligns better with Chinese stylistic preferences for presenting comparative data over a period.



3.2.3 Sentence segmentation and reorganization

Long, complex English sentences, particularly those with multiple layers of subordination, can become syntactically convoluted and logically opaque if translated literally into Chinese. Conversely, the paratactic chains common in Chinese can seem rambling or lack clear logical connections if rendered directly into English. Segmentation (breaking down long sentences) and reorganization (reordering clauses for logical clarity) are often necessary. Liu (2007) suggests that English sentences can be segmented at conjunctions or semantic breaks, adapting them to Chinese expressive norms.

Example 10

Source Text: Our analysis of markets, policies and technologies by country and fuel *indicates that* global coal consumption will not return to its 2018 levels in the coming years, which would make 2013 its historic peak.

Target Text: 我们基于国家、燃料两个维度对市场、政策和技术进行了分析。结果表明, 在未来数年间, 全球煤炭需求并不会重返其 2018 年的水平, 这就意味着 2013 年将是其达到历史顶峰的一年。

Analysis: The English source sentence contains a main clause with a complex subject (“Our analysis...”), followed by an object clause introduced by “that”, which in turn contains a non-restrictive relative clause introduced by “which.” A literal, single-sentence translation into Chinese would be lengthy and potentially confusing due to the nested structure. The translator segments the sentence into two. The first sentence isolates the action of analyzing (“我们.....进行了分析”). The second sentence begins with an explicit cohesive marker, “结果表明” (“The results indicate/show”), which makes the logical link to the previous sentence explicit. Furthermore, the relative clause introduced by “which” is translated starting with “这就意味着” (“this means that”), explicitly signaling the implication or consequence. This segmentation and addition of explicit logical markers (“结果表明”, “这就意味着”) breaks down the complexity and reorganizes the information flow to better suit Chinese reading habits (Liu, 2007).

Example 11

Source Text: 这是一次庞大的能源体系变革, 不仅需要新能源、储能、氢能、特高压等能源自身技术的进步, 还需要能够支撑新型能源体系的其他技术创新, 比如智慧控制技术、区块链技术等。同时, 还要创新商业模式, 优化电动车分时充放电, 提高充电桩布局密度, 布局更多加氢站等, 充分利用现有的电力系统挖掘潜力, 提高效率, 推动新兴产业的发展。

Target Text: This is a huge change in the energy system that

- a) Requires advancements in energy technologies including new energy, energy storage, hydrogen energy and UHV;
- b) Necessitates other technological innovations supporting the new energy system, such as intelligent control and blockchain technology;



- c) Innovates business models simultaneously by optimizing the time-of-use pricing of EV charging and discharging, increasing the number of charging piles in distributed areas and building more hydrogen refueling stations; and
- d) Leverages the potential of existing power completely so as to improve efficiency, thus advancing the development of emerging industries.

Analysis: The original Chinese text describes the multiple requirements and actions involved in the energy system transformation using a series of parallel clauses linked implicitly or by simple conjunctions like “不仅需要...还需要...” (“not only requires... but also requires...”) and “同时, 还要...” (“At the same time, it also requires...”). While grammatically correct, this paratactic structure results in two very long sentences containing dense information. Translating this directly could overwhelm an English reader accustomed to more structured presentation, especially in technical writing where clarity is paramount. The translator reorganizes the content by identifying the core requirements/actions signaled by the recurring verbs (需要, 需要, 创新, 利用) and restructures them into an enumerated list (a-d) under a single introductory clause. This explicit structuring uses enumeration as a form of visual and logical explicitation, breaking down the dense information into manageable points and clarifying the parallel nature of these requirements, thereby enhancing readability and cognitive processing for English readers.

3.3 Discourse level

Cohesion, the network of lexical and grammatical links that hold a text together, is crucial for discourse coherence. Hu (1994) emphasizes the dynamic nature of language and the need to preserve textual cohesion in translation. Halliday and Hasan’s (1976, 2007) framework identifies key cohesive mechanisms in English, including reference, substitution, ellipsis, conjunction, and lexical cohesion. While both English and Chinese utilize these mechanisms, their frequency and preferred forms can differ significantly due to typological variations (e.g., English reliance on overt conjunctions vs. Chinese preference for parataxis and zero anaphora). Translating sci-tech texts, which demand logical rigor and clarity, often requires explicitating logical connections or adjusting cohesive devices to ensure discourse integrity and accurate information transfer in the target language.

3.3.1 Logic explicitation.

While both languages use conjunctions, English often relies more heavily on overt logical connectors (e.g., *because, therefore, however*) to signal relationships between clauses or sentences, characteristic of its hypotactic nature. Chinese may leave these relationships implicit, relying on parataxis and contextual inference (Pan & Hu, 2008). In translation, especially into English or when clarifying complex relationships in Chinese, translators may need to make these implicit logical links explicit by adding conjunctions or logical markers.



Example 12

Source Text: With its rapid decline in the United States and Europe, coal's future will depend heavily on *the small but significant group of countries* – China, India, Indonesia, Pakistan, Bangladesh, the Philippines and Vietnam – *that account for 70%* of global coal consumption and most of the world's new coal power projects.

Target Text: 随着欧美国家煤炭消费量急剧下滑，煤炭未来该何去何从将主要取决于中国、印度、印度尼西亚、巴基斯坦、孟加拉共和国、菲律宾以及越南。虽然这些国家数量不多，却举足轻重，因为它们消费了全球 70% 的煤炭，并且承担了全球大多数的煤电新建项目。

Analysis: The English source text uses a restrictive relative clause (“that account for...”) to explain why the mentioned group of countries is “significant.” The logical relationship (causality) is embedded within the relative clause structure, a common feature of English hypotaxis. The Chinese translation makes this causal link explicit by introducing the conjunction “因为” (“because”), aligning with Blum-Kulka's (1986) observation that translations often exhibit higher levels of explicitness than source texts, particularly regarding cohesive ties. Furthermore, the phrase “small but significant” implies a concessive relationship (small number, yet significant impact). The translation also explicates this implicit contrast by adding the overt concessive structure “虽然.....却.....” (“Although... yet...”), a common strategy for marking concession explicitly in Chinese (Pan & Hu, 2008). These additions of explicit logical markers (“因为”, “虽然.....却.....”) clarify the underlying reasoning and contrasts for the Chinese reader, making the discourse structure more transparent and potentially reducing processing effort compared to a more literal rendering of the English syntax (Baker, 1992).

3.3.2 Omission in cohesion

English, with its emphasis on syntactic completeness (hypotaxis), frequently uses cohesive devices like pronouns (e.g., possessive pronouns) and conjunctions, even when the referent or logical link might be contextually inferable. Chinese, prioritizing parataxis and semantic coherence, often omits such elements, employing zero anaphora (omission of pronouns where referents are clear) and relying on context to bridge logical gaps, reflecting different conventions for achieving textual cohesion (Pan & Hu, 2008; Li & Thompson, 1981; Baker, 1992). Translating from English to Chinese often involves omitting cohesive markers that are obligatory or preferred in English but redundant or unnatural in Chinese. This is less about explicitation (making implicit source text info explicit in target text) and more about adherence to target language norms, which can sometimes result in implicitation (making explicit source text info implicit in target text), particularly obligatory implicitation driven by systemic linguistic differences (Klaudy, 1998).

Example 13

Source Text: Since then, the big diversified miners, with the exception of Glencore, have left or dramatically reduced *their* coal exposure.



Target Text: 自此，除瑞士的嘉能可公司之外，其他大型多元矿产公司都已停止或大幅减少煤炭相关业务。

Analysis: The English source text uses the possessive pronoun "their" to explicitly mark the possessive relationship, adhering to English grammatical requirements. However, including the equivalent Chinese pronoun “它们的” (ta men de) would result in a redundant and stylistically unnatural sentence in Chinese. Chinese frequently employs zero anaphora, where pronouns are omitted if the referent is contextually clear (Li & Thompson, 1981; Pan & Hu, 2008). In this case, the possessive relationship between “miners” and “business” is readily understood by Chinese readers without the pronoun. By omitting the pronoun “它们的”, the translator adheres to standard Chinese syntactic norms. From the perspective of communicative effect, this omission, while formally a reduction, serves an explicitation-like function in a pragmatic sense: it removes unnecessary linguistic material that could hinder smooth processing for the Chinese reader, thereby making the intended meaning (the clear possessive relationship within the context) more directly and naturally accessible. This choice prioritizes target language fluency and reader expectation, arguably leading to a clearer and more effective communication of the core message than a literal translation would achieve (Baker, 1992).

3.3.3 Addition in cohesion

English discourse relies heavily on overt cohesive markers to signal logical relationships, whereas Chinese often embeds these relationships implicitly. As Zhang (2009, p. 83) notes, “When the target discourse lacks cohesive elements, the cohesive features become implicit, making semantic relationships hard to identify.” Translators must therefore judiciously supplement cohesive markers to ensure coherence and logical clarity.

Example 14

Source Text: 而 2015 至 2019 年，全球平均气温相较 2011 至 2015 年又上升了 0.2 摄氏度，是有记录以来最热的五年。这种趋势还将持续。留给人类的排放空间和减排时间窗口已经很小，任务紧迫。

Target Text: Another 0.2°C has risen between 2015 and 2019 based on the 2011-2015 period, which has been listed as the hottest five years on record. *Worse still, the rising trend is ongoing.* That means there are few carbon budgets for emissions, and a window of opportunity for emission reduction.

Analysis: The Chinese source text presents a sequence of facts: record heat, the continuation of the trend, and the resulting urgency (small emission space/time window). The sentence “这种趋势还将持续” (“This trend will also continue/is still ongoing”) follows the statement about record heat. While the logical connection implies a worsening situation, it is not explicitly marked. A literal translation like “This trend will continue” might lack the rhetorical force and sense of negative progression intended in the context. By adding the explicit cohesive marker and evaluation signal “Worse still,” the translator makes the implicit negative progression and the severity of the situation explicit for the English reader. This addition functions as pragmatic



explicitation, clarifying the logical relationship and amplifying the intended urgency, thus achieving functional equivalence in discourse coherence and tone (Baker, 1992; Zhang, 2009).

4. Conclusion

This research investigated the application of explicitation strategies in the translation of sci-tech texts between English and Chinese, focusing specifically on the energy domain. Through a qualitative case analysis of seven articles, various explicitation techniques were identified and examined at the lexical, syntactic, and discourse levels. The findings indicate that translators employed a range of strategies to navigate the linguistic and conceptual challenges inherent in this specialized genre. At the lexical level, annotation, contextual adaptation, and the addition of established technical terms were observed as methods to enhance clarity and ensure semantic precision. At the syntactic level, strategies such as clause adaptation, structural transformation, and sentence segmentation/reorganization appeared necessary to bridge the typological gap between English hypotaxis and Chinese parataxis. At the discourse level, logic explicitation and adjustments in cohesive devices were utilized to maintain coherence and logical progression. While the specific methods varied, the explicitation strategies observed in this limited corpus appeared to generally align with the overarching goals of enhancing target reader comprehension and ensuring communicative effectiveness within the specific context of sci-tech translation, with choices seeming context-dependent rather than adhering to universal principles.

The findings of the research hold several implications for both translation theory and practice. Theoretically, this research contributes to the ongoing discussion of the Explicitation Hypothesis (Blum-Kulka, 1986) within the specific context of English-Chinese sci-tech translation. While instances of added information support the general tendency toward explicitness, it also highlights phenomena like obligatory implicature driven by target language constraints, suggesting that the manifestation of explicitation is complex and interacts significantly with language typology and genre conventions. The analysis further underscores the crucial interplay between linguistic structures (hypotaxis vs. parataxis) and the necessity for syntactic adaptation, reinforcing the idea that translation strategies are heavily influenced by contrastive differences (Lian, 2013; Pan & Hu, 2008). Practically, the research provides empirical examples of how the demands for precision and clarity in sci-tech texts shape the application of explicitation. It offers insights for translators, underscoring the importance of domain knowledge and showcasing specific restructuring techniques (e.g., handling relative clauses, merging/splitting sentences) applicable to English-Chinese translation in this field. Awareness of differing cohesive preferences is also shown to be crucial. For translator training, these findings emphasize incorporating contrastive linguistics, genre analysis (Bhatia, 1993), and targeted practice in adaptive strategies for effective sci-tech communication.

However, it is important to acknowledge the limitations of this study. The findings are based on a qualitative analysis of a relatively small corpus from the energy sector; thus, the results may not be readily generalizable to all sci-tech fields or language pairs. The analysis focused primarily on explicitation. Future research could expand to a larger, more diverse corpus, potentially incorporating quantitative methods to identify strategy frequencies. Investigating explicitation in different sci-tech sub-domains (e.g., medicine, IT) and comparing findings across genres could yield further insights. Additionally, exploring the interplay between explicitation and other translation phenomena, such as



implication, simplification, and normalization, within English-Chinese sci-tech translation would be a valuable avenue for further inquiry.

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