

# "以人为本"的能源转型，如何看待G20议程

## 实现清洁与包容性能源转型

为何全球能源转型进展不如预期？我们如何调整政策方向

尽管全球电力中太阳能和风能的比例从2010年的不足2%增加到12%，人类在应对气候变化紧急情况方面却在失去优势。到2050年，至少一半的全球能源需求预计将由可再生能源满足。然而，只有6%的人认为《巴黎协定》中1.5°C的目标能够实现。根据IPCC主席的说法，世界正走向2100年气温升高3°C的轨道，要在2050年前将升温控制在2°C以内，需要付出极大的努力。我们现在正处于气候危机的关键和不可预测阶段。适应与减缓的投资和行动必须相应推进。气候变化的影响——包括更频繁的极端天气事件——不再是未来的可能性，而是当前的现实。这些分布不均的影响增加了生态系统崩溃的风险，并带来了大规模社会动荡的新威胁。

大规模整合可再生能源并非易事，也并不廉价或快速——而且可再生能源革命正面临气候变化、生活成本危机、新的能源冲击和供应链中断的威胁。通过自上而下的供给侧或以技术为中心的方法无法实现进展。挑战不仅是加速行动，还要在公正和韧性中实现更深层次的脱碳。我们需要动用所有能源杠杆——金融、技术和社会力量。全球资本和技术并不短缺，但在人们和社区更好地理解其角色和行动能力方面，仍然是所有净零路线图中最大的盲点。

**世界能源理事会欢迎巴西主办的G20峰会关注社会包容性和公正性。**

## 如何调动更多的人群、代际和多元化社区，共同推动“更好的”能源转型？

在2024年4月，理事会举办的第100届世界能源大会汇聚了来自84个国家的4,000多位领导者，围绕“为人类与地球重新设计能源”的主题展开了一场开创性、包容性和跨代领导力对话。得出的结论发人深省。

**我们取得今天成功的路径，无法保证我们未来的成功。**

在不同地区，以不同速度、通过多样化技术路径实现的多重能源转型正在出现。没有单一的突破性技术可以解决所有问题，必须充分利用所有可用杠杆，避免制定特定的政策处方。

成功的关键在于管理复杂的、相互关联的协调挑战。社会变革的拉动力是技术和金融创新推动力实现规模化的关键。

**以人为本的能源打开了调动包容性解决方案的新空间**

能源转型的社会现实是复杂且混乱的。我们必须超越碎片化的单一议题——绿色就业、现代能源获取、可负担性、能力建设、许可、韧性等。推动全面且包容的能源解决方案，需要全社会的共同努力和多方面协作。

世界能源理事会一直致力于推动更加全面和包容的能源转型，其“人性化能源”愿景与行动议程是实现全球性转型动员与影响的关键。我们的独立且长期的全球领导力网络覆盖了100多个国家的所有能源转型相关领域，积极致力于以下目标：

- 加强对新机遇和解决方案领域的共同理解，为实现转型性的能源转型推动政策调整和新市场设计。

- 赋能社区，帮助其理解自身角色，做出明智的选择并改变行为。
- 支持不同地区彼此借鉴，分享成功经验与教训。
- 倡导互动、包容和跨代际的解决方案驱动型领导力对话，并利用协作式前瞻洞察重新设计清洁和包容的净零排放路线图。

## G20与世界能源理事会携手前行的机遇

我们邀请G20能源部长与世界能源理事会及其社区进一步合作，共同应对能源安全、可负担性与可持续性在韧性和公正下的管理挑战。请[登记](#)以获取更多简报：

- 1. 世界能源议题监测报告：**探讨“社会能源问题集群”的兴起以及优先事项的差异。
- 2. 世界能源三难指数：**追踪能源可负担性多年来的下降趋势。
- 3. 动态韧性：**出一种全新的方法，准备应对新型能源冲击、系统中断及跨地区的挑战。
- 4. 世界能源情景规划：**利用情景规划基础，探索多样化的路径，在动荡转型中对齐利益，快速扩大合作。
- 5. 战略学习机会：**享各地区经验——大规模整合可再生能源、支持社会承担完整系统成本（包括基础设施与能力建设），以及构建“动态韧性”，从多重冲击中恢复并在极端事件后重启电网。

人性化能源

包容性转型的多维框架

社会能源问题的增多

“社会能源问题正受到越来越多的关注，包括能源的可负担性、可接受性以及劳动力转型，这些都被视为关键的不确定因素。”

数据来源: 世界能源问题监测报告, 世界能源理事会, 2021-2023年

能源可负担性的下降

“自2000年以来，家庭电力的可负担性下降了23%，其中G20国家的降幅达到了20%。”

数据来源: 世界能源三难指数, 世界能源理事会, 2000-2023年

全球能源获取差距

“全球仍有6.85亿人无法获得基本电力，21亿人依赖有害的烹饪方式。要减少能源贫困并实现经济发展，需要设定雄心勃勃的目标——达到现代能源的最低标准。”

数据来源: 可持续发展目标报告, 2024年

气候融资 - 严重资金不足且存在偏向

“到2030年，气候融资必须每年增加至少五倍。然而，最易受气候变化影响的发展中国家仅获得了总额的不到2%。”

数据来源: 气候政策倡 (CPI), 2023年

资产搁浅与社区破坏

“仅提前退役化石燃料发电厂一项，到2050年可能导致全球超过5,000亿美元的资产搁浅。其中超过70%的损失将影响亚洲和非洲国家，同时使数百万人面临经济流离失所和社会破坏的风险。”

数据来源: 《自然》杂志, 2022年

中小企业与绿色金融缺口

“中小企业占全球企业的90%，提供了全球50%的就业岗位，并贡献了新兴市场高达40%的GDP，同时也显著贡献了温室气体排放。近一半的中小企业表示缺乏资金是其气候行动的障碍，而70%的企业需要更多资金加速净零转型。由于有限的报告能力，许多中小企业难以获得可持续融资，这威胁了它们的生存和对社区的影响。”

数据来源: 经合组织 (OECD), 2023年

项目超支与延误

“65%的大型能源项目面临重大成本和时间超支问题，这通常是由于利益相关方参与不足，以及低估了社会和环境复杂性所致。”

数据来源: 牛津大学大型项目研究, 2019年

能力差距

“超过40%的能源雇主难以找到具备能源转型所需技能的员工。尽管全球劳动力中的‘绿色人才’在增加，但对绿色技能的需求增长速度超过了供应。此外，性别差距正在扩大；只有1/10的女性具备至少一种绿色技能，而男性的比例是1/6。”

数据来源: 《全球能源人才指数, 2023》; 《绿色技能报告, 2023》

青年与社会能源运动

“超过80%的年轻人认为，他们在与能源和气候政策相关的决策过程中未被充分纳入。”

数据来源: 联合国青年气候报告, 2022年

# HUMANISING ENERGY: A LOOK AT THE G20 AGENDA

MAKING CLEAN AND INCLUSIVE ENERGY TRANSITIONS HAPPEN

## WHY IS GLOBAL PROGRESS ON ENERGY TRANSITIONS SLOWER THAN EXPECTED AND HOW CAN WE SHIFT POLICY GEARS?

Humanity is losing ground in addressing the climate change emergency, even with the increase of solar and wind power in global electricity generation from less than 2% to 12% since 2010. By 2050, at least half of world energy usage is expected to be met with renewables. Even so, only 6% believe the Paris Agreement limit of 1.5°C will be met. According to the Chair of the IPCC, the world is on track for 3°C by 2100, and a heroic effort is needed to stay below 2°C by 2050.

We are now in a critical and unpredictable phase of climate crisis. Investment and actions on adaptation and mitigation must progress accordingly. Climate change impacts – including more frequent extreme weather events – are no longer future possibilities, but present realities. Their unevenly distributed impacts increase the risk of ecological collapse and present a new threat of massive societal upheaval.

Integrating renewables at scale is not easy, cheap or fast - and the renewables revolution is at risk from climate change, the cost-of-living crisis, new energy shocks and supply chain disruptions.

Progress cannot be achieved through top-down, supply-side or technology-centric approaches. The challenge is not only to go faster, but to accelerate deeper decarbonisation with justice and resilience. All energy levers will be needed – financial, technological and societal.

There is no shortage of global capital or technology.

But the role of people and communities better understanding their roles and agency remains the biggest blind spot in all net zero roadmaps.

**THE WORLD ENERGY COUNCIL WELCOMES THE BRAZIL G20 PRESIDENCY FOCUS ON SOCIAL INCLUSIVITY AND JUSTICE.**

## HOW CAN WE MOBILISE MORE PEOPLE, GENERATIONS AND DIVERSE COMMUNITIES IN MAKING ‘BETTER’ ENERGY TRANSITIONS HAPPEN?

In April 2024, the Council’s 100<sup>th</sup> anniversary World Energy Congress convened over 4,000 leaders from across 84 countries in a groundbreaking, inclusive, and intergenerational leadership dialogue, on the theme Redesigning Energy for People and Planet. The conclusion reached is sobering.

**HOW WE GOT TO HERE, WON’T GET US TO WHERE WE NEED TO BE!**

Multiple energy transitions along diverging technology pathways are emerging in different places, at different paces, across diverse regions. There is no single breakthrough technology; it is essential to utilise all available levers and avoid specific policy prescriptions.

Success depends on managing complex interconnected coordination challenges. The pull of societal transformation is key to scaling the push of technology and financial innovation.

**HUMANISING ENERGY OPENS A NEW SPACE FOR MOBILISING INCLUSIVE SOLUTIONS**

The social realities of energy transitions are messy. It is important to rise above fragmented, single-issue agendas – green jobs, modern access, affordability, capabilities, licensing, resilience, etc.

The Council has led the world in championing more holistic and inclusive energy transitions, with

a humanising energy vision and action agenda which is key to global step change mobilisation and impact.

Our independent and permanent global leadership community network, spanning all energy transition interests in over 100 countries, is actively working to:

- Foster shared understanding of the new opportunities and solutions space shifting policy gears and new market designs for transformative energy transitions.

- Boost ‘active’ energy literacy to empower communities in understanding their roles, making informed choices and changing behaviours.

- Encourage regions to lead with and learn from each other about what is and is not working.

- Convene a new model of interactive, inclusive and intergenerational solutions-driven leadership dialogues – and use new insights from collaborative foresight – to (re)design clean & inclusive net zero road maps.

## OPPORTUNITIES FOR THE G20 AND WORLD ENERGY COUNCIL TO MOVE FORWARD TOGETHER

We invite the G20 Energy Ministers to work more closely with the World Energy Council and community on the challenges of managing security, affordability and sustainability with resilience and justice. Please [register your interest](#) in receiving further briefings:

**1. World Energy Issues Monitor:** The rise of the ‘social energy issues cluster’ and variations in priorities across regions.

**2. World Energy Trilemma Index:** Tracking a decrease in energy affordability across decades.

**3. Dynamic Resilience:** A new approach to preparing for new energy shocks, system disruptions and unpriceable risks.

**4. World Energy Scenarios:** Navigating turbulent transitions using World Energy Scenarios Foundations to explore diverse pathways to align interests and accelerate collaboration at speed and scale.

**5. Strategic Learning Opportunities:** Sharing learning across diverse regions – integrating renewables at scale, supporting societies in meeting full systems costs (including infrastructures and capabilities), and building ‘dynamic resilience’ to recover from multiple shocks and restart grids after extreme.

HUMANISING ENERGY

A MULTI-DIMENSIONAL FRAMEWORK TO INCLUSIVE TRANSITIONS

**RISE OF SOCIAL ENERGY ISSUES**

“There is an increasing attention to ‘social energy issues’ including **affordability, acceptability and workforce transitions** as critical uncertainties.”

Source: World Energy Issues Monitor, World Energy Council, 2021-2023.

**DECLINE IN ENERGY AFFORDABILITY**

“There has been a **23% decline** in household electricity affordability since 2000, with a **20% drop** in G20 countries.”

Source: World Energy Trilemma Index, World Energy Council, 2000-2023.

**GLOBAL ENERGY ACCESS GAP**

“**685 million** people worldwide still lack basic access to electricity, and 2.1 billion people rely on harmful cooking solutions.

Reducing energy poverty and achieving economic development requires ambitious targets – a **modern energy minimum.**”

Source: Sustainable Development Goals Report, 2024.

**CLIMATE FINANCE - SEVERELY UNDERFUNDED AND BIASED**

“Climate finance must increase by at least **five-fold** annually by 2030. Developing countries – the most vulnerable to climate change – receive less than 2% of total.”

Source: Climate Policy Initiative (CPI), 2023.

**STRANDING BILLIONS, DISRUPTING COMMUNITIES**

“The early retirement of fossil power plants alone could strand over US\$500 billion in assets globally by 2050.

More than **70%** of these losses would impact countries in Asia and Africa, while simultaneously exposing millions of people to economic displacement and social disruptions risks.”

Source: Nature, 2022.

**SMES AND THE GREEN FINANCE GAP**

“SMEs make up 90% of firms, 50% of global employment, and up to 40% of GDP in emerging markets, while contributing significantly to GHG emissions.

Nearly half cite **lack of finance as a barrier to climate action**, and 70% need more funds to accelerate net-zero efforts. Many struggle to access sustainability finance due to limited reporting capacity, risking their survival and community impact.”

Source: OECD, 2023.

**COST OVER-RUNS AND DELAYS**

“**65%** of large-scale energy projects face significant cost and schedule overruns, often due to inadequate stakeholder engagement, underestimating social and environmental complexities.”

Source: Oxford University Study on Megaprojects, 2019.

**CAPABILITIES GAPS**

“Over **40%** of energy employers struggle to find workers with the skills needed for energy transitions.

While ‘green talent’ in the global workforce is increasing, demand for green skills is outpacing supply, and gender disparity is widening; **only 1 in 10 women**, compared to 1 in 6 men, has at least one green skill.”

Source: Global Energy Talent Index, 2023; Green Skills Report, 2023.

**YOUTH AND SOCIAL ENERGY MOVEMENTS**

“More than **80%** of youth believe they are not adequately included in decision-making processes related to energy and climate policies.”

Source: United Nations Youth Climate Report, 2022.