
Key Messages
RSPRC x TWAIT
Taiwan in Transformation:
Initiating a Long-Term Energy Transition

TWiT

Contents

Becoming a Proactive State to Respond to the Systematic Risks of Climate Change

1.Everyone is talking about climate change, it can no longer be ignored.

Climate change has given rise to numerous risk incidents, such as melting glaciers, intensifying heat, and increasingly bizarre weather episodes; but what is even more alarming is that the global society is facing the potential consequence of systems failure at each and every level. In the face of increasing global risks, the World Economic Forum has proposed that “fundamental reforms to market capitalism may be needed”; especially with countries worldwide facing major changes in technology, industry, population, the environment, society, climate change and health, which therefore calls on humanity to move towards a new model of development.

2.The United Nations’ proposed solution: global net-zero greenhouse gas emissions by 2050

The United Nations’ Intergovernmental Panel on Climate Change (IPCC) released the ‘Special Report on Global Warming of 1.5°C’ in 2018, which highlighted that if humanity wants to limit global warming to below 1.5°C, then global greenhouse gas emissions must be reduced by 40% to 60% from 2010 levels by 2030, and net-zero emissions must be achieved by the middle of the century. The IPCC report also points out that if we are serious about reaching this goal, then fossil fuels such as coal-fired power, would need to be reduced to less than 8% of total electricity generation, while renewable energy needs would need to see a substantial increase to 77.5%. However, such a carbon reduction scenario is based on including many socially-controversial technological options, such as geoengineering, carbon capture and storage and additional nuclear power plants.

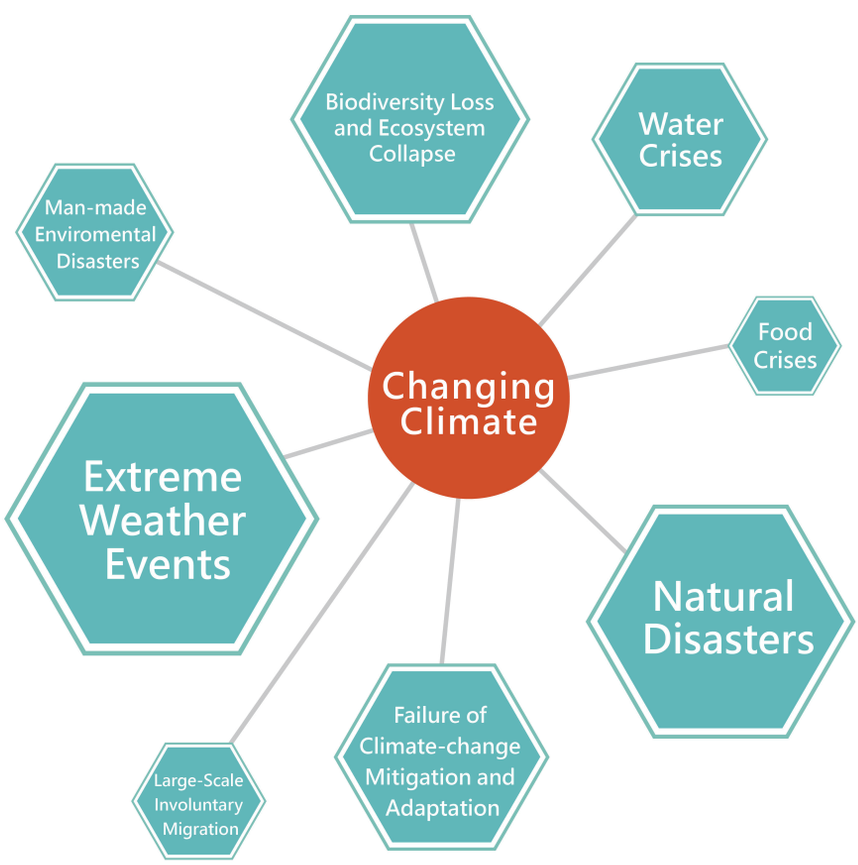
3.WBGU’s new practical direction: using ‘proactive states’ to accelerate the decarbonization of the global energy system by 2050.

The world-renowned German Advisory Council on Global Change (WBGU) proposed a more concrete solution which would be able to avoid the aforementioned high-risk carbon reduction technologies while at the same time achieve rapid coal reduction – by encouraging a think through of how fundamental social transformation can be used to achieve the rapid decarbonization of the energy system. In order to carry out these new solutions, there would be a need for effective policy tools to guide innovation in a new direction so as to accelerate the diffusion of such innovations. At the same time, there is a need to establish an investment-friendly system and environment, which would promote the development of global infrastructure that would enable decarbonization to occur more rapidly and increase resource efficiency.

4.We need to become a ‘proactive state’ and provide greater opportunities for participation.

The pursuit of climate targets should be done in a way that is compatible with societal principles, and conducted based on ideals such as equality and broad-based participation. If the vision of decarbonization is to be fulfilled, this would require a new energy transition governance structure. We should therefore move towards being a proactive state with extended opportunities for participation, by incorporating the climate policy goals into both the constitution and law, expanding information disclosure and civil participation, mainstreaming climate policy in government policies and parliamentary politics, and establishing a representative system for future generations.

[1] IPCC (2018). Global warming of 1.5°C.



The Need to Shake Off the Shackles of Taiwan's High Carbon Energy Structure

There are five major characteristics of Taiwan's current energy situation:

1.A major consumer of coal in the world

Due to the ever increasing demands of industrial energy consumption and the sluggish development of renewable energy, Taiwan therefore ranks 11th globally in terms of coal consumption, and 4th in terms of net coal imports.

2.The significant energy consumption in the industrial sector

When compared globally, Taiwan's industrial energy consumption of total energy consumption ranks the 4th highest in the world. When comparing with other developed countries and the neighboring countries in Asia, Taiwan's total energy consumption per unit of GDP is three times that of Japan and Germany, and two times that of Singapore.

3.Cheap and unreasonable energy prices

According to the 2018 data released by the International Energy Agency's (IEA), when comparing data on Taiwan's electricity price with the neighboring countries in Asia, Taiwan's residential electricity prices were the 3rd lowest in the world in 2017, while its industrial electricity prices were 6th lowest.

4.The high risks of nuclear power

The four nuclear power plants in Taiwan are one of the very few nuclear reactor sites in the world that are simultaneously vulnerable to the triple threats of earthquakes, tsunamis and floods. When comparing the exposed populations around reactor sites, Taiwan's first and second nuclear plants rank among the top three in terms of the number of people residing within 30km of the reactor stations.

5.The poor results in Taiwan's promotion of renewable energy

Despite Taiwan having introduced a renewable energy feed-in tariff system in 2010, renewable energy as a proportion of the overall power composition remains at only about 1%; this is in contrast to Japan which after adopting a similar renewable energy feed-in tariff system in 2012, has seen its renewable energy increase to more than 5% in five years.

These five major characteristics therefore reveal that Taiwan's economic development is built on a high carbon structure; and thus, on the path of low carbon transition and long-term carbon reduction, it is vital for Taiwan to break free from this high carbon structure of development in order to reduce the risks of climate change.

Renewable Energy Feed-In Tariff (FiT)

Renewable energy feed-in tariffs (FiT) is a system to ensure the guaranteed purchase of renewable energy. FiT originated from Germany's 'Renewable Energy Sources Act', which via the long-term guarantee for the purchase of renewable energy, has encouraged a rapid increase in the number of renewable energy installations. There are currently more than 70 countries that have adopted this system.

[1] IEA(2018). "World energy balances" Paris: International Energy Agency.
[2] TaiPower Company (2019) Comparison of Electricity Prices across Countries.
[3] Maplecroft (2011). "Nuclear Risk Map." ; Rodriguez-Vidal, J. Rodriguez-Llanes,JM., Guha-Sapir, D. (2012). "Civil nuclear power at risk of tsunamis." Natural Hazards 63 (2): 1273.
[4] Butler D.(2011). "Nuclear safety: reactors, residents and risk." Nature;472: 400-–01.

The Price of the Brown Economy—The Hidden Cost of Energy

The reality is that the continued use of fossil fuels is having a huge impact on our environment in the form of climate change, air pollution, the loss of biodiversity and other issues, however such environmental impacts are not reflected in the energy costs for the industries and the public. According to an International Monetary Fund (IMF) 2015 report, the air pollution, greenhouse effect, traffic congestion, etc., caused by Taiwan's fossil fuel use resulted in external costs of US$29 billion in 2015. Based on Taiwan's annual GDP of US$570 billion, the external costs of fossil fuels would amount to more than 5% of the overall GDP.

●The neglect of external costs has resulted in unreasonable electricity prices.

However, the IMF estimates did not take into account the costs of mineral extraction or the release of harmful air pollutants such as arsenic and mercury, and as such, using the European Commission's 'Subsidies and costs of EU energy' report, the National Taiwan University's Risk Society and Policy Research Center conducted an initial assessment of the external costs of various power generation technologies (such as coal-fired power generation, gas-fired power, renewable energy, and nuclear energy), and estimated that the external costs derived from Taiwan's power system would be as high as NT$560 billion. This is almost equivalent to the total electricity expenditure paid by the Taiwanese public which amounted to about NT$600 billion, therefore if Taiwan were to internalize its current environmental external costs into its electricity prices, the electricity price would need to increase by 93%, to NT$5.6 per kWh.

●We are paying the price for the consequences of the brown economy

At present, Taiwan's current low energy prices are due to overprotective government policies which have ignored the 'bubbles' created by government finances and the impact to individual health, as can be seen from the fossil fuel subsidies and current electricity prices which do not reflect the external costs. It is precisely because of our long-term reliance on the brown economy for our economic development, that has led to our current predicament, where we are constantly trying to rationalize or ignore these external costs, thereby creating the structural problems that have become difficult to resolve today.

[1] International Monetary Fund (IMF) (2015), "IMF Survey: Counting the Cost of Energy Subsidies." In International Monetary Fund.

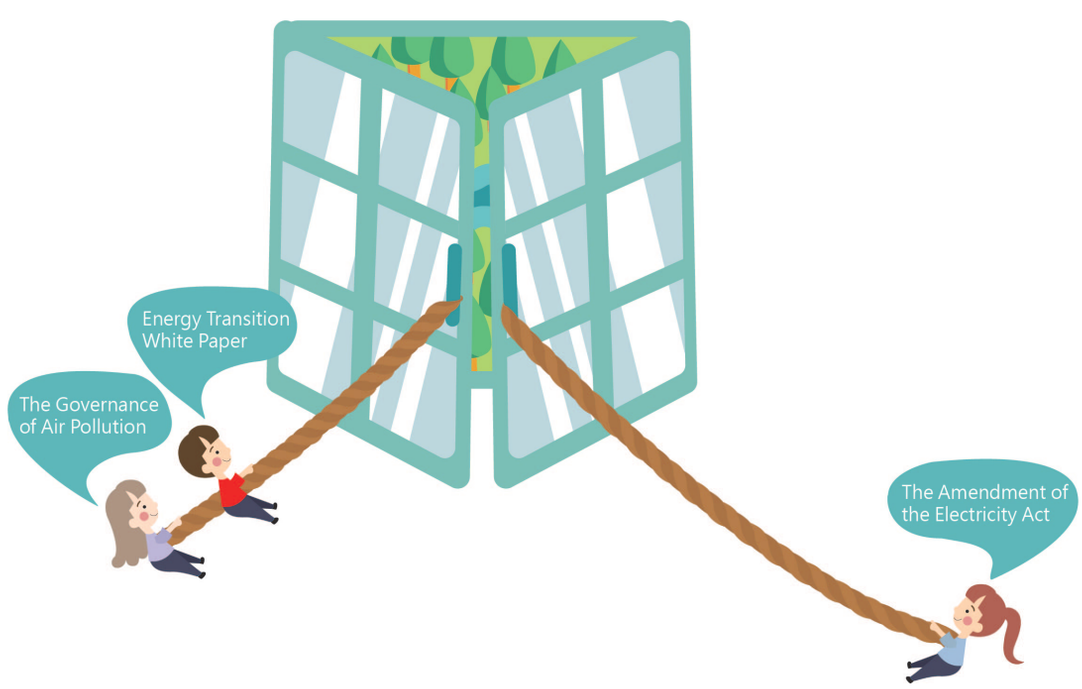
A Window of Opportunity for Energy transition

After coming into power in 2016, the Democratic Progressive Party (DPP) amended the Guidelines on Energy Development, with the goal of ensuring energy security, environmental sustainability and social equity, develop a green economy, and to strive for a nuclear-free homeland by 2025, so as to achieve sustainable energy development. In addition to establishing the goal of a nuclear-free homeland, improving air quality was also included as an important policy plank, in response to increasing calls from the public for a reduction in coal-fired power generation.

In 2019, the DPP released an energy transition white paper, after consulting with the public since 2017 via consultations at the district level, working groups, citizen conferences, and other forms of public participation and stakeholder collaboration, to develop twenty key energy strategies, including defining the roles of stakeholders in energy transition, and the promotion of citizen power plants, energy efficiency improvement plans for various sectors, as well as the 'Renewable Energy Industry Promotion Project'. Although new governance mechanisms were developed following the energy transition white paper, it has not been possible to sidestep the political limitations. Therefore, if Taiwan wants to embark on its energy transition pathway, there is a need to break through the political limitations, so that we would be able to use the whole set of governance mechanisms to consider the following 'windows of opportunity':

1.An energy transition momentum driven by air pollution

In 2017, the government proposed new action plans and measures on air pollution. In comparison to the original energy transition strategy which only focused on making changes to the power composition, the 'Air Pollution Control Act' is much broader in scope to encompass the replacement of boiler fuels and the promotion of electric-powered transportation, and these strategies then work together to form a synergy between air pollution prevention and energy transition, which in fact reversed the decision to expand the coal-fired Shen'ao power



2.Shaping the new electricity market

In 2017, Taiwan also made major amendments to the Electricity Act, in an attempt to remove the regulatory barriers that had not been rectified for the last 50 years, in particular with regards to the market structure and management systems. The reforms to the Electricity Act were made based on the principle of opening up the power generation market and electricity selling market, and targeting the electricity industry supply chain to encourage competition, though the power transmission and distribution sector would remain in the hands of the government. Finally, the government adopted the 'Green Power First' policy, which is a two stage policy amendment to first open up the renewable energy power generation industry and the renewable energy sales industry, so as to participate in the electricity market through the direct and indirect transmission and distribution of the electricity industry; and second, to deprivatize the electricity grid and establish a new electricity regulatory authority, so that the traditional thermal power industry will be free to sell its electricity in the second stage of amendment, after the first stage is completed. In addition, expanding the role of the public in the electricity market would give the added momentum for the construction of a new electricity market; where citizens would no longer just be consumers, but where they would be able to participate in the planning, development, production and consumption of renewable energy via the promotion of citizens power plants.

3.The emergence of multiple actors

The promotion of energy transition in Taiwan does not only occur at the level of central government policy changes, but various actors are also involved in the legislature, cities, industry, civil society and community. At the level of the central government, the Legislative Yuan has since 2016 reconvened a cross-party platform, the 'Sustainable Development Committee', and also successively established the 'Renewable Energy Promotion Association', the 'UN Sustainable Development Goals Advisory Council of Parliament', and the 'Greenhouse Gas Reduction Working Group' and other subgroups, which have since held related public hearings and promoted legislation relevant to energy transition. On the other hand, citizen groups have also advocated on energy transition issues, from being focused on nuclear safety and nuclear plant construction, to policy collaboration and the promotion of green energy communities today. In 2015, several civil groups also joined hands to establish the Energy Transition Promotion Alliance, to evaluate the effectiveness of local governments in promoting energy efficiency, and to encourage local governments to commit more administrative resources into handling energy-related issues, in addition to cooperation between citizens and relevant groups to integrate citizen power plants into the local culture, and other examples of citizen action.

An Energy Transition Path to Respond to the Climate Crisis

Although Taiwan has set the goal of adjusting the power structure by 2025 to become non-nuclear, reduce coal and increase green energy, as well as proposed a five-year implementation plan as stipulated in the energy transition white paper, however other countries have proposed more aggressive net-zero carbon emission goals over the longer term, in response to the Paris Agreement and the increased citizen attention being placed on climate issues. Under Taiwan's Greenhouse Gas Reduction and Management Law, a long-term goal for 2050 is expressly stipulated, which demands for carbon emissions to be reduced by half from 2005 levels, which therefore points to the need for more active policy planning for Taiwan's energy transition - this should include supplementing the inadequate administrative measures in the energy transition white paper in order to achieve the 2025 energy transition goal; creating new legislation or making adjustments to the current power structures so as to achieve the targets outlined under the Greenhouse Gas Reduction and Management Law; or better still, by developing a more complete set of laws and regulations to facilitate energy transition, as well as by mainstreaming climate policy, in order to achieve the 2050 carbon reduction goal.

By using the analytical method of 'Transformative Policy Mixes', our research team adopted policy mixes to enhance the impact of the policy recommendations, speed up the process of energy transition, avoid path dependence, reform the system, inspire the development of a social vision and its communication, as well as attempt to overcome policy barriers. In response to the current challenges that are holding back Taiwan's energy transition, our research team developed the following climate and energy transition policy mixes, with the aim of achieving comprehensive transition in Taiwan:

1.Adopt Participatory Governance Innovation

Improve public energy literacy and reform the energy administration system to achieve the goal of mainstreaming energy transition.

2.Internalize External Costs

Implement a greenhouse gas cap-and-trade program and energy tax, with the aim of changing business strategies and consumer choices, to speed up the adoption of environmental friendly technologies and products.

3.Develop a Sustainable Power Market

Amend the Electricity Act such as by establishing an independent electricity regulatory authority, implementing environmental regulations in the electricity industry as well as by promoting citizens power plants; with the aim of strengthening the electricity market in order to facilitate the development of renewable energy.

4.Strengthen Local Energy Governance

Make regulatory amendments to empower local governments in the management of energy issues, such as by establishing specialized agencies and for the development of medium- and long-term energy transition strategies, in order to fundamentally strengthen local governance capabilities.

5.Implement the Industrial Energy Efficiency First Principle

Over the last ten years, the industrial sector has seen the highest energy consumption in Taiwan, which reflects its massive impact on the overall energy supply and demand. Therefore, strengthening energy management capabilities in the industrial sector and improving energy efficiency would substantially reduce energy consumption in this sector.

6.Accelerate Green Capital Flows

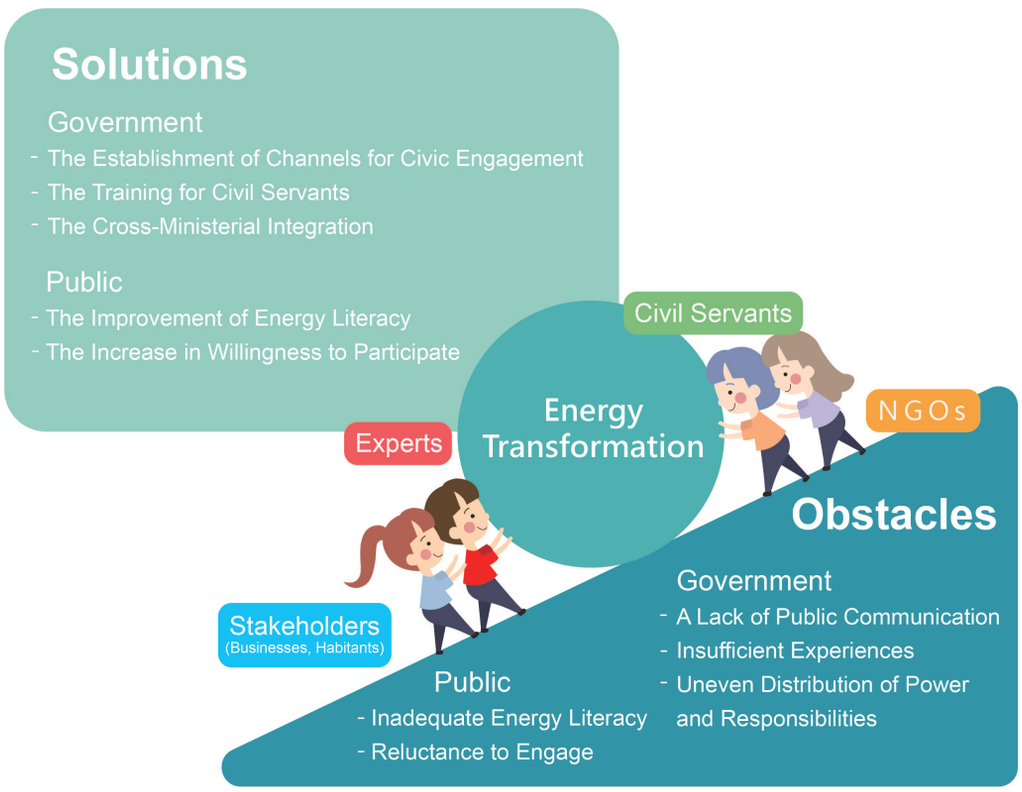
Apply external pressure on the financial sector to identify and assess the exposure to climate-related risks, so as to improve investment choices and reduce the dependence of financial capital on the fossil fuel system.

Path Dependency

Path dependency refers to the fixed patterns that are developed in the choices people make when interacting with systems, technologies and objects, which then lead to a dependence on the chosen pathways and related regulations; and like in the physics concept of inertia, results in people sticking to the same path once they have embarked on it.

[1] K.S. Rogge, B. Pfluger, F.W. Geels(2018). Transformative policy mixes in socio-technical scenarios: the case of the low-carbon transition of The German electricity system (2010–2050).

Enhance Social Synergy to Accelerate Policy Mainstreaming : By Adopting Participatory Governance Innovation



Current Challenges

The key to participatory governance is the principle of inclusiveness, focusing on improving people's willingness to participate and enhancing their background knowledge on relevant issues, creating the impetus for the public to proactively participate in decision-making, as well as the integration of cross-ministerial departments and the innovation of participatory mechanisms, in order to overcome at the most fundamental level the path dependency that humans have over-relied on in our technological and economic development, in our regulatory and policy mechanisms, as well as in our attitudes and habitual behaviors in our daily lives. Taiwan currently faces the following challenges in participatory governance innovation:

1.The Necessity of Improving Energy Literacy Among the Public

While the survey on energy risk perception that our center conducted last year showed that the Taiwanese public are concerned about Taiwan's energy transition, they nonetheless do not have an adequate understanding of Taiwan's main electricity generation method and energy policies, which thereby demonstrates the necessity for the improvement of energy literacy and awareness among the general public.

2.The Limited Effectiveness of Current Participation Mechanisms

The government believes that the lack of energy literacy lies in the inadequate disclosure and diffusion of information, and has therefore proposed organizing more face-to-face and online energy courses in the second phase of its Energy Transition White Paper. However, our center's survey showed that close to 60% of the Taiwanese public are unwilling to participate in such activities, which therefore suggests that activities currently planned for would have limited effectiveness in reaching out to the general public.

3.The Lack of Social Learning Mechanisms

There is a general lack of trust towards the completeness and information openness of the civil participation mechanism outlined under Taiwan's energy transition, while the public also shows a lack of willingness to participate in events, which therefore results in a need for the government to create a social learning path and guidance over the longer term, and through the promotion and the continuous accumulation of experience and energy, can then be used to respond to Taiwan's energy transition.

4.The Lack of Inter-Ministerial Integration

Taiwan's current promotion of energy transition-related policies is still largely dependent on political will to drive it. As such, other than grassroots initiatives, it is still important for higher ups in government to receive information and assistance, which thus makes inter-ministerial integration an important component of participatory governance innovation.

Proposed Action Plans

In order to develop an environment conducive for good participatory governance, it is necessary to strengthen the channels for participation on the one hand, while strengthening the administrative capacity on the other, so as to be able to effectively consolidate the information and suggestions received from various participatory channels, and translate them into policy proposals. In addition to the horizontal integration of ministries, it is also necessary to build vertical channels to involve public participation, such as in enhancing the public's energy literacy and their willingness to participate. In summary, the following five measures are core to implementing participatory governance innovation:

1.Promote the Mainstreaming of Energy Transition

The key to promoting energy transition lies in having the Premier of the Executive Yuan take the lead in transformation policy, by working with the various ministries and local governments, to comprehensively consider climate change and energy transition issues in the planning, implementation and assessment of policies, so that the public sector can adjust its needs in terms of its talent cultivation, audit and supervisory mechanism, and legal systems, to promote transformation in a holistic manner.

2.Establish a Clear System of Transition Governance

Energy transition involves climate governance innovation, which should be elevated to the level of the cabinet, by consolidating the climate actions at national-level ministries and local governments, to establish a clear governance system and organizational transformation, and to also establish an independent climate change or climate policy committee via legislation which could provide policy recommendations and oversight on climate-related issues.

3.Deepen Energy Literacy

Members of the public and stakeholders have limited access to information and participation, and also lack basic knowledge, resulting in them having difficulty locating relevant information, or having to only engage in passive participation at the end. There should therefore be greater access to information on energy transition, and targeted approaches to raising awareness on energy issues, by identifying the appropriate channels to outreach to the various target groups.

4.Enhance Social Legitimacy and Participation

The government should establish participatory mechanisms on which other ministries can adopt, in order to ensure that social opinions are fed back into policy making. Inviting citizen participation before policy decisions are made would also enhance their social acceptance and reduce the resistance to policy implementation, as well as strengthen the legitimacy of policy decisions.

5.Establish a Think Tank on Transitional Issues

In order to address the four aforementioned recommendations, it is necessary to establish an independent research system at a university or within society, to provide independent reviews and analyses, and produce critical knowledge and information, which on the one hand can be used to redress government policies, and on the other hand transfer knowledge to the general public, as well as encourage interactive and participatory learning, and develop consensus on energy transition, so as to generate social learning curves for the government, society, industry and media.

Establish the True Costs of Carbon Emissions and Pollution: By Internalizing External Costs

Current Challenges

In order to undergo energy transition, it is necessary for the general public to understand the impact of traditional energy systems on the society and environment, and to highlight the necessity of structural adjustments. However, in the promotion of relevant policies, the following bottlenecks have been met:

1.The Ineffectiveness of Green National Income Accounting

Since 2000, Taiwan has been compiling green national income accounts, however the current official compilation does not allow the public to understand the external costs of energy supply and demand, due primarily to three issues: narrow coverage, outdated assessment methods, and undifferentiated sectoral contributions.

2.The Exclusion of Cost-Effectiveness in External Costs

In the formulation of policies and the planning of major public works, cost-benefit analysis should be conducted to effectively assess the impact of these programs on the society as a whole. Although the major development plans of the current government have been submitted for cost-benefit analysis, the analyses conducted have been brief and lack accuracy, which therefore leads to the results of such cost-benefit analyses lacking in credibility. Since 2015, the National Development Council has been promoting its Regulatory Impact Assessment mechanism, but in the relevant operations manuals that have been prepared, externals costs have not been taken into consideration.

3.The Presence of Existing Structural Loopholes

Carbon prices which are set at too low a level will diminish the incentive for industries to adopt carbon reduction initiatives, and global emissions trading systems (ETS) would therefore need to establish a carbon base price or a market stability reserve to prevent this from happening. At present, Taiwan has yet to discuss incorporating such ETS best practices into the sub-legislation, which therefore means loopholes in the system which have yet to be patched up.

4.A Lack of Timeline for the Implementation of Energy Tax

At present, the competent authorities overseeing energy and environmental issues have ignored the impact of energy tax on fiscal reform, energy transition and social equity, but the Executive Yuan continues to regard energy tax as an issue to be handled by the Ministry of Finance, and have lost sight of how energy tax should be administered and coordinated by the Premier of the Executive Yuan. In addition, energy tax encompasses the two fundamental principles of ensuring the ‘polluter pays’ and to ‘punish the evildoers while rewarding the well doers’, and is a necessary tool to uphold environmental justice.

Green National Income Account

According to the Directorate-General of Budget Accounting and Statistics (DBGAS) of the Executive Yuan, the green national income account refers to the “environmental account” or otherwise also referred to as the “resource account” or the “environmental and economic account”, and it is mainly used to monitor the degradation of the natural environment and resource base during the country’s economic development.

Proposed Action Plans

In order to resolve the abovementioned issues, current international governance mechanisms to promote the internationalization of external costs should be adopted as part of Taiwan’s core transformational measures:

1.Periodic Estimation and Disclosure of External Costs

The first task at hand should be to instruct relevant ministries and agencies, such as the Bureau of Energy and the Environmental Protection Administration, to jointly develop an estimation method for the external costs of the energy system, and to request that the DBGAS compile a green national income account which should also include the external costs of the energy system as part of its annual report. A mechanism for the regular disclosure of external costs should also be developed as part of the statutory annual green national income account, where industries should be required to fully disclose the external costs of their energy systems, which should then be fed back to the annual central government budget.

2.The Institutionalization of Policy Evaluation

As part of the operations manual for Regulatory Impact Assessment, an additional chapter on environmental external cost estimation should be developed and included into the third phase of the Regulations for Periodic Regulatory Goals and Approaches of the Greenhouse Gas Emissions.

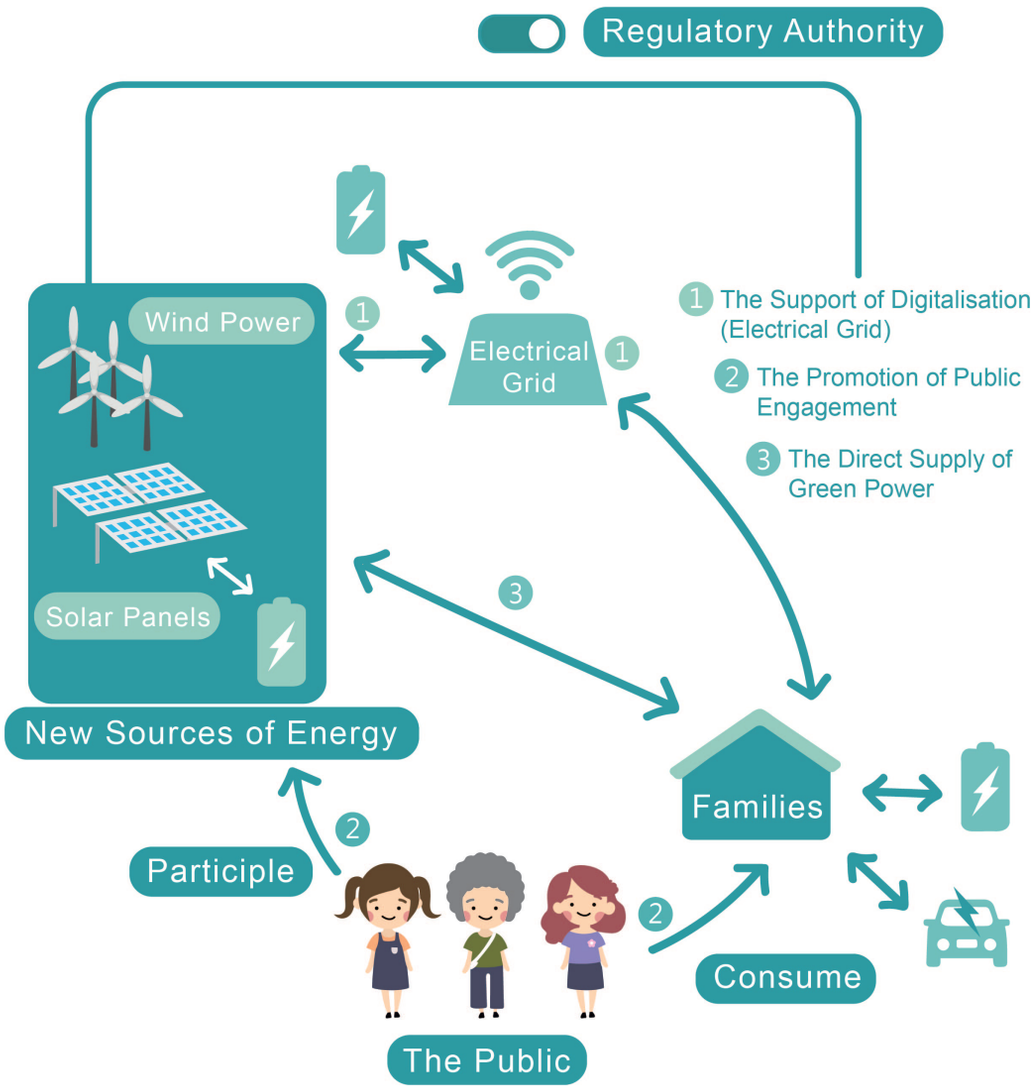
3.Fossil Fuel Subsidy Reform

In view of the fact that fossil fuel subsidies span the work of multiple ministries and agencies, the subsidy reform should be coordinated by the Office of Energy and Carbon Reduction at the Executive Yuan, with the Bureau of Energy as the lead agency. Starting from 2020, estimations of the fossil fuel subsidies should be conducted every two years, based on the fossil fuel subsidy reform peer review process led by the APEC Energy Working Group, and stakeholder consultations conducted, to eventually publish review reports which can be communicated with the public, with the aim of completely eliminating fossil fuel subsidies by 2025.

4.Promote Carbon Pricing

Carbon pricing is the most critical of these proposed measures, because whether it can be successfully implemented depends on the support of businesses and the public, and therefore requires careful analysis of an effective implementation strategy. From the business perspective, the government should follow the international trend of internal carbon pricing and the adoption of emissions trading systems, in order to similarly promote the adoption of internal carbon pricing by local industries, so as to familiarize energy-intensive industries with the emissions trading system. For the public, the government should come out with a draft energy tax bill in the areas such as tax rates, uses, the scope of levy, and hold consultations with the general public via civic conferences with people from all walks of life to achieve a consensus. In addition, it would be necessary to work with citizen groups to organize social communication actions on energy tax issues, in order to advocate for an energy tax legislation.

Ensure Flexibility in a New Era of Energy Democracy: By Developing a Sustainable Power Market



Current Challenges

Taiwan's electricity market is in need of two types of reforms: on the one hand, the traditional state-owned integrated power industry needs to be transformed to an environment that promotes new competition in the industry, while on the other, new market regulations need to be developed with immediacy, in response to the development trends of low carbonization, decentralization, electrification, digitalization, and the democratization of the power system. On the legal front, even though regulations such as the 'Greenhouse Gas Reduction and Management Act', the 'Electricity Act', and the 'Renewable Energy Development Act' have been adopted and amended, they still face the following inadequacies:

1. The Dual Problems of Taiwan's Low-Carbon Regulations

Taiwan's power plants currently lack carbon emission controls and only the carbon emission factor of electricity generated by the public electricity industry is regulated, meanwhile emissions from thermal power plants are left unchecked, and there are no mechanisms to prevent thermal power plants from participating in the power capacity mechanism, which is akin to ignoring carbon emissions released by the thermal power plants. In addition, due to the incomplete renewable energy certificate system and the lack of economic incentives to encourage the free trade of green energy, the green power market is therefore stuck in a deadlock.

2. The Lack of Incorporation of Power System Flexibility into Market Design

The current misconceptions surrounding energy shortages, and the lack of power system flexibility planning for green energy, require social discourse and regulations to be strengthened in order for these issues to be addressed.

3. The Passive Push for Citizen Power Plants

In the transformation of the power market, the potential of citizen power plants as a platform for power market transformation has still not been explored, which could include decentralizing power risks, increasing awareness of energy conservation, and social transformation.

4. Inadequate Energy Transition Capacity of Competent Authorities

At present, energy transition activities are undertaken by existing governmental organizations, but training of relevant personnel, the operation of the electricity market trading platform, the allocation of responsibilities between ministries, and the experience and skills necessary for transition, such as communication, are lacking.

Proposed Action Plans

To create a sustainable power market, it is important to target the following sectors: electric power generation, transmission and distribution, end consumers and regulatory agencies. The core transformation measures include:

1.Fix the Low Carbon Regulatory Gap

It is necessary to develop long-term plans for carbon emission controls for thermal power plants as well as restrictions on thermal power plants participating in the electricity market, in addition to resolving the regulatory conflicts that exist between the feed-in-tariffs, the renewable energy certificate market and standards for electricity sold by the public electricity industry, and even to accelerate the development of an emissions trading system, in order to stimulate the green power market.

2.Establish Requirements for Power System Flexibility

In order to achieve a low carbon and decentralized power market, it is necessary to be able to effectively manage the fluctuation and uncertainty of power supply and demand. In order to improve the flexibility of the power system, strengthening the regulation capacity of the power system will be a crucial measure, and in addition to developing more expertise in the regulation of power generation equipment, and in basic equipment such as transmission and distribution networks, electricity market reforms such as the promotion of energy storage devices, demand response systems and the digitization of transmission and distribution networks should be implemented as regulatory measures.

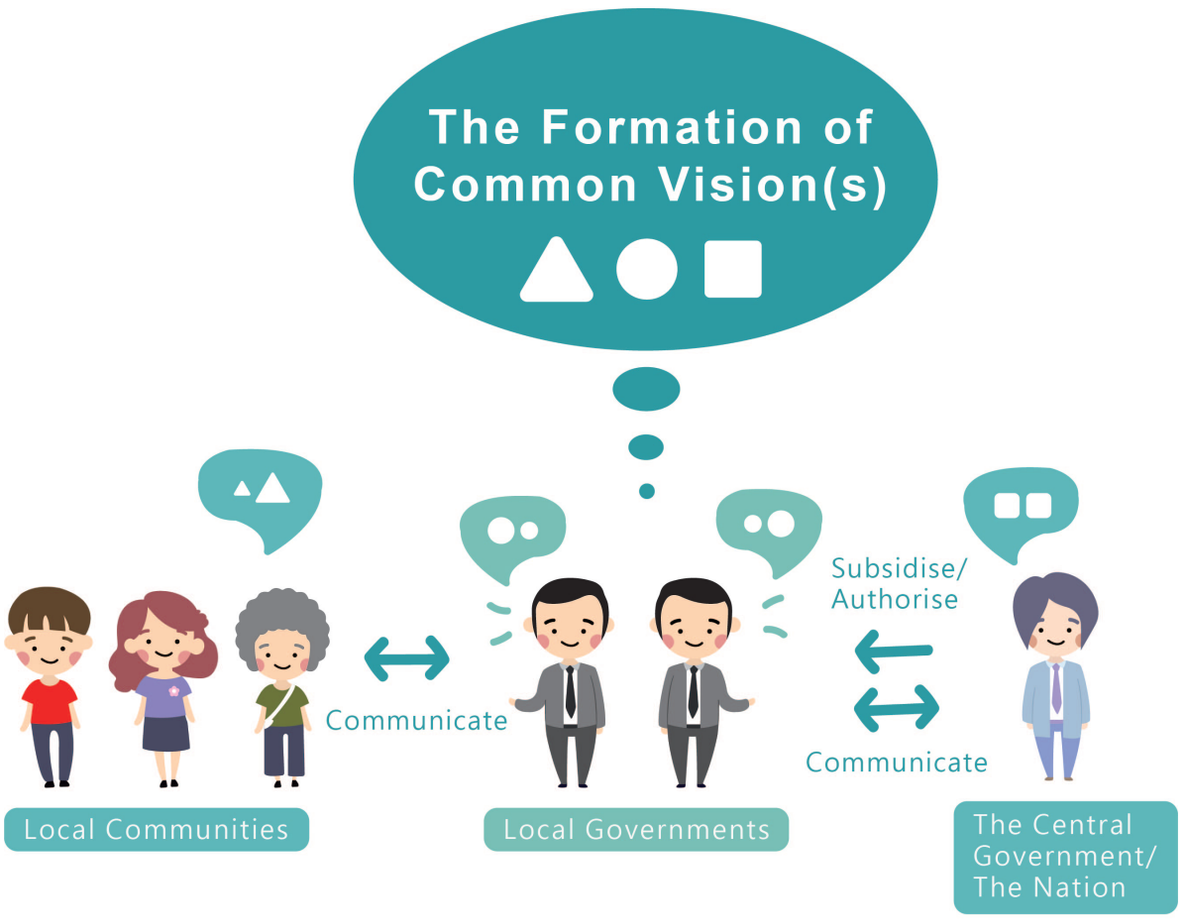
3.Develop a Comprehensive Rollout Plan for Citizen Power Plants

In order to put in practice energy democracy as well as enhance local energy autonomy and disaster response capabilities, the threshold for citizen participation should be lowered, and a comprehensive promotion mechanism and support system established, in addition to the integration of inter-ministerial resources and the cultivation of local talents, so as to give rise to multiple benefits, such as that of local creation, and to further establish mandatory scheduled targets and a stable legislative framework, in order that citizens can grow to become all-round players in the electricity market.

4.Strengthen the Transformation Capability of the Electricity Regulatory Authority

For the first phase amendment of the ‘Green Power First’ policy, it is necessary to establish an electricity trading platform, as well as think about how the state-owned power transmission and distribution industry can find its competitive niche as part of the process of the digitalization of the power system. In conjunction with the second phase amendment of the Electricity Act, it is anticipated that there will be a dramatic increase in free competition in the power market, and an independent electricity regulatory authority would therefore need to be established for the regulation of the electricity market.

Bridge the Gap between the Central and Local Governments: By Strengthening Local Energy Governance



Current Challenges

In the past, local governments were not empowered with the responsibilities and powers to oversee local energy development, and energy governance was therefore seen as additional responsibilities. Due to the lack of practical experience in the field, local governments are therefore confronted with the following challenges:

1.The Unclear Responsibilities and Powers of the Local Government

Energy planning has traditionally been dominated by the central government, while local governments lack institutional support in energy implementation.

2.The Importance Placed on Energy Policies is Dependent on the Energy Perception of Local Leaders

The level of understanding of local leaders on energy issues have an impact on the execution ability of local governance teams.

3.The Lack of Governing Resources

Local governments have in the past lacked experience in energy management. Currently, there are three energy management specialty units in Taiwan's cities/counties, and four cities/counties have set up administrative project offices for the promotion of green energy or energy conservation. On the whole, the current governance model has impacted on talent development in local energy governance, as well as resulted in a lack of funds for energy governance.

4.The Lack of a Favorable Environment for Data Application

Local governments lack experience in conducting energy use and energy conservation potential assessments, and there is also a lack of complete information and data provided by the Taiwan Power Company at the local level, which thereby prevents local governments from developing more detailed and innovative policy designs.

Proposed Action Plans

Energy transition needs to be jointly pushed by the central and local governments. Local governments often play the role of communicating policies enacted by the central government to local populations, and therefore have to simultaneously adopt policies as set within a framework by the central government, as well as respond to the needs of local communities and populations. Due to the nature of governance, local governments are therefore nimbler, and would thus be able to develop more detailed and innovative policies. In addition, while policy actions are spearheaded by local governments, they are require the participation of multiple stakeholders, and as such local energy governance needs to be enhanced, both in terms of strengthening local governing abilities and building the capacity of stakeholders.

1.Empower Local Governments

In future, the energy governance and team capabilities of local governments should be enhanced based on their different levels of expertise, the relevant laws and regulations in relation to local energy governance should also be improved in phases, and the financial autonomy of local governments should also be strengthened.

2.Stimulate Innovation Strategies

By developing innovative governance strategies, it would be possible to avoid path dependence in governance, as well as enable laggard local governments to learn and catch up with forward-moving local governments. Innovative strategies and policies would include research on the various financing methods and sources, the establishment of basic data and the enhancement of its use, local energy governance models that involve multiple stakeholders, as well as increasing venture capital opportunities for local energy industries.

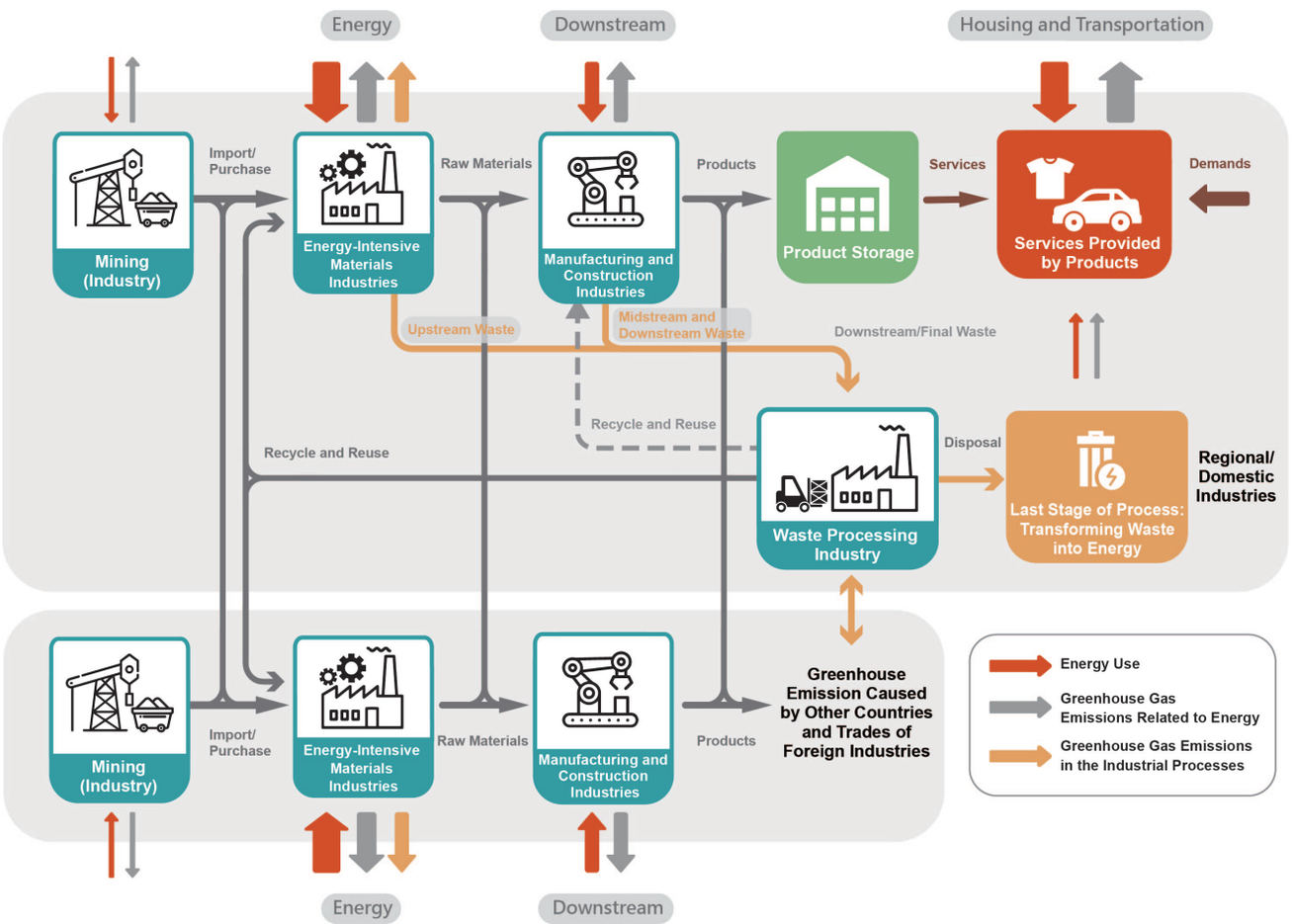
3.Establish Long-Term Planning Capabilities

It is necessary to develop a long-term vision for energy and social transformation, and then formulate policies based on such a vision. At present, policies and targets at the city and county level exist in silo, which as a result leads to gaps such as in how air pollution governance and energy planning targets therefore do not align. As such, local governments need to set climate change and carbon reduction targets according to the different phases of the climate plan at the national level, as well as ensure alignment between competing policies and targets, which should also include actions such as conducting a regional resource inventory as well as regional energy governance and relevant future planning.

4.Reshape Local Energy Awareness

Any form of transformation would entail changes to social consciousness, people's behaviors, and risk perceptions and attitudes. In addition, when climate issues become infused with political ideology, it can interfere with the established policy goals or plans. In addition, energy policies at the city and county level need to be combined with local characteristics, as well as foster local innovation and local energy transition and governance, and to also reconstruct local awareness and systems in order to stimulate the grassroots awareness among the general public, so as to develop successful case studies which can serve as examples to other cities and counties.

The Need for Industrial Transformation and Energy Efficiency: By Implementing the Industrial Energy Efficiency First Principle



Current Challenges

Taiwan relies on imports for 98% of its energy needs, and the industrial sector has consistently been the largest source of energy consumption and carbon emissions. In 2018, the energy consumption of the industrial sector accounted for 32% of the total energy consumption in Taiwan. When including for the industrial use of fossil raw materials, the industrial energy consumption accounted for more than 50% of the total national consumption, in the broad sense. In 2018, the value of energy imports per capita amounted to NT$63,650. If industrial energy efficiency policies can be effectively planned and implemented, it would then be possible to reduce Taiwan's expenditure on imported energy. At the same time, the industrial sector would be able to increase its profits due to energy savings, which could then be invested in research and development in energy efficiency, and to enhance competitiveness. There are currently four main challenges in promoting industrial energy efficiency policies in Taiwan:

1.A Lack of Incentive to Invest in Energy Efficiency due to Low Energy Prices

Due to the current low energy prices in Taiwan, it has been difficult to motivate companies to embark on energy efficiency.

2.An Unclear Roadmap in Promoting Supporting Tools for Energy Efficiency

The current implementation for energy efficiency-related regulations (such as a greenhouse gas cap-and-trade scheme and energy tax), has been slow and unclear. In addition, current energy-efficiency solutions have been focused mainly on the short-term (up to 2025) or have been based on amending existing programs, but there have been no major innovations in regulatory approaches or economic incentive tools, which have therefore not provided any impetus for industries to adopt energy efficiency or carbon reduction initiatives.

3.A Lack on Medium-Term and Long-Term Planning for Energy Transition

At present, there have been no high-level policies, such as a national carbon reduction plan or an energy transition blueprint, that have been developed, and the subsequent plans and implementations of relevant industrial policies by the Ministry of Economic Affairs have therefore often neglected energy-efficiency, which has not been conducive for cross-ministerial policy integration.

4.A Lack of Information Transparency Pertaining to Corporate Climate and Energy Performance

As there has been a lack of information pertaining to corporate energy use and climate action, it has been difficult to evaluate and compare the climate and energy performance across companies, as well as to monitor their climate action.

Proposed Action Plans

The design of industrial energy efficiency policies should involve economic incentives and the establishment of regulatory tools, such as energy tax, in order to spur companies into adopting the following four strategies:

1.Tighten Energy Efficiency Regulations

The Bureau of Energy should strengthen energy efficiency obligations, as well as expand equipment energy efficiency coverage and standards, and using the regulations for energy conservation and efficiency as the basis, strengthen the obligations for energy efficiency and green energy use for the electronics, petrochemical and steel industries. At the same time, companies should be encouraged to adopt digital technologies and enter into voluntary long-term agreements on energy efficiency, as well as strengthen their resource management capabilities, and upstream and downstream integration in the industrial chain, to collectively improve industrial energy efficiency results.

2.Undergo a Decarbonization Processes

The government should accelerate the implementation of energy efficiency supporting tools, such as a greenhouse gas cap-and-trade scheme, energy tax, and tax incentives for low-carbon research and development, as well as promote the low-carbon transformation of energy-intensive industries by the adoption of process conversion, product structure adjustment and talent cultivation. Considering that carbon capture, storage and utilization technologies will reach commercialization potential by 2030, the government should also introduce relevant technologies for energy-intensive industries in the future, as well as develop phased targets and corresponding supporting measures to enable industries to adopt these technologies.

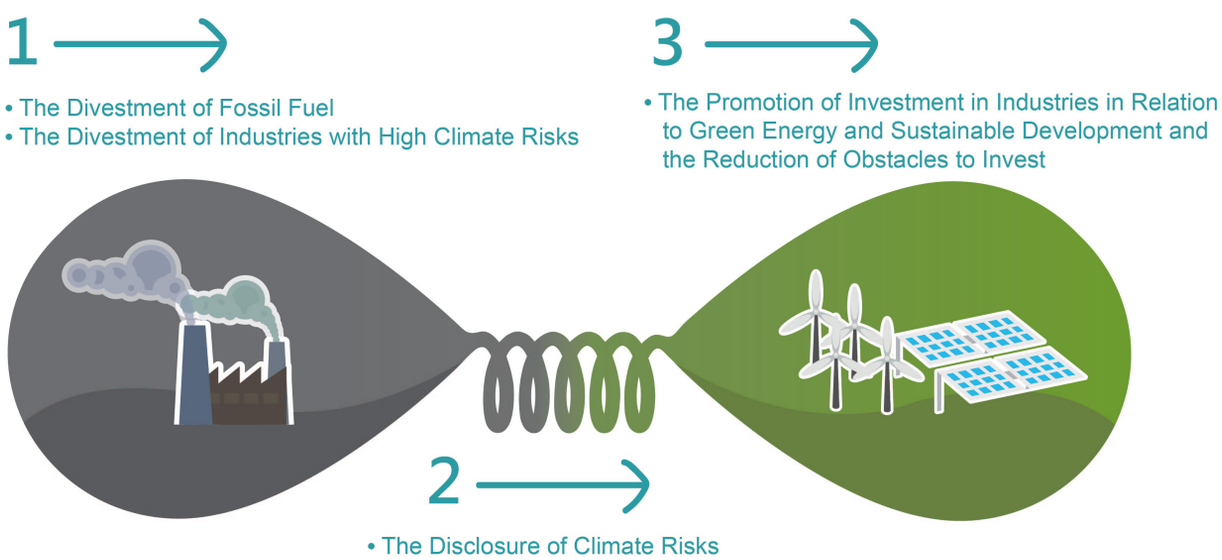
3.Develop Circular Economy Synergies

The various government ministries should enhance cooperation to evaluate the legal, administrative, technical, economic and information issues faced by the industrial and science parks in their energy resources integration, to overcome these inefficiencies. In addition, the government should also implement phased-in regulations on single-use products, advanced strategies for external cost internalization and material substitution, massive data analysis applications, and the development of reverse logistics infrastructure, in order to promote a service-oriented manufacturing industry and achieve a balance in the production and demand of products, so as to maximize the use of energy and resources.

4.Corporate Energy Performance Disclosure

The Financial Supervisory Commission, Bureau of Energy, and the Environmental Protection Administration should jointly evaluate the disclosures made by large energy users, as well as set up a common disclosure platform and identify the disclosure items and data formats required, to facilitate energy performance disclosures. It is also necessary to improve the quality of corporate climate information to the public, enhance the climate risk perception of businesses and stakeholders, to strengthen participation in climate action.

The Next Step in Green Finance: By Accelerating Green Capital Flows



Current Challenges

The impact of climate change has attracted the attention of the financial and investment sectors. However, either from the perspective of risk aversion or environmental sustainability, the "greening" of finance should not be only about strengthening "green financial investments" but would also require more proactive actions. In particular, while the government has promoted "green finance" in terms of "green energy investments" and "green bonds", it has neither sought to improve the climate risk disclosure of investment projects nor strengthen investment reforms to achieve the true "greening of finance".

1.The Limited Scope of the Green Finance Action Plan

Taiwan's current "green capital" regulations is limited in its imagination, and is confined to the environmental, social and corporate governance (ESG) of responsible investment, as well as on enhancing the level of green energy investment. The current plan is focused on strengthening aspects such as green investment and green bonds, as well as in providing rewards and the promotion of green energy investment, but there are still inadequate reforms in terms of green capital flows.

2.The Lack of Participation by Taiwanese Sovereign Funds in International Green Mechanisms

The level of understanding of local leaders on energy issues have an impact on the execution ability of local governance teams.

3.A Lack of Basic Information Pertaining to Climate Risk Assessment

If financial stability is of concern, the information disclosure of risks faced by businesses would be the topmost priority when it comes to green capital flows, however the climate related disclosures made by investment firms remain inadequate, resulting in a lack of risk assessment data. According to a survey of the 100 largest public retirement funds in the world, more than 60% of the funds have taken little or no actions in response to climate change and its impact.

4.Fossil Fuel Divestment

In addition to risk disclosure, sovereign and retirement funds which have invested in fossil fuel-related industries for a long time, are also faced with risks of their now stranded assets due to climate change, and they would therefore need to gradually divest from the high-risk carbon-intensive industry.

Sovereign Funds

Quasi-sovereign funds are investment companies set up by the government to consolidate the country's state and private assets, where the state is the majority shareholder. At present, Taiwan does not have plans to set up quasi-sovereign funds, but considering the special statuses and complexities of the four major government funds in Taiwan (Public Service Pension Fund, Labor Insurance Fund, Labor Pension Fund and Postal Savings Fund), a broader definition of "quasi-sovereign funds" will be used to describe government investments. However, a portion of the four major funds are also referred to as sovereign funds, which therefore highlights the role they play in the green capital policy.

Proposed Action Plans

The key to developing a green capital policy lies in the reduction of climate risks, the elimination of investment obstacles, and the creation of an environment conducive to transformation in the context of risk disclosure. Four strategies are outlined below:

1.Adopt International Green Capital Standards

In addition to many private banks having independently signed up to the Equator Principles, the Taskforce on Climate-related Financial Disclosures (TCFD) is currently the most important green capital standard, and has been regarded by many international organizations and advocacy group as an important reference document, such as for the Global Reporting Initiative (GRI)'s GRI Sustainability Reporting Standards (GRI Standards). International green capital standards should therefore be adopted, with regular reports produced on climate risk disclosure and risk communication.

2.Climate Risk Disclosure

Members of the public are still largely unclear about the investments made by investment firms when looking at the financial information disclosed by the quasi-sovereign funds, which suggests that the climate-related risk disclosures made by investment firms are still inadequate. Climate-related risk disclosures and climate risk surveys should therefore be implemented in the financial sector to improve the awareness of climate risks in the financial system as well as improve the risk management of the financial system.

3.Fund Allocation Adjustment

IUnder the framework of climate risk disclosure, the direction of green capital flows is dependent on the asset allocation of the quasi-sovereign funds managed by government ministries, which would require these funds to terminate their investments in industries with high climate risks, gradually adjust their current investment portfolio and asset allocation, and finally, to strengthen investments in industries in relation to green energy and sustainable development.

4.Develop Complete Policies to Promote Green Capital Flows

A blacklist of firms which continue to invest in industries with high-carbon emissions could be created, which could then be used as an investment guide for firms, as well as provide a list of firms which adopt sustainable investment practices, and those which do not, so that by using a mix of positive and negative reinforcers, in addition to the implementation of green capital policy tools, the hope is that the investment market would one day independently support green industries even without the need for government policy incentives.

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