Furthering Adaptation Measures and its Synergies with Mitigation Measures

By Phillia Restiani*

It becomes more apparent nowadays that climate change is happening, despite the debate about to what extent anthropogenic activities have contributed to the severity of the problems. The Third Assessment Reports (TAR) of the Intergovernmental Panel on Climate Change (IPCC) states that even with the best possible scenario of measures to reduce greenhouse gases and CO_2 emissions climate change including climate variability and extremes still occur. Furthermore, mitigation measures that have and will be taken to deal with climate change will also bring about changes which require societies to adjust. On this ground, adaptation is needed to moderate the negative impacts and exploit the opportunities resulting from climate change.

Discussions about adaptation to climate change so far are mostly tied to mitigation strategies. This approach recognises adaptation as a strategy to complement mitigation strategy in climate change policies. Unfortunately, research and discussion regarding adaptation are thus conducted mainly using the framework of mitigation, particularly the impact assessment approach. However, adaptation to climate change embraces a wider societal perspective that requires the use of a different approach, other than just physical impact assessment.

This article will discuss the general framework of adaptation in climate change policy and approaches to conducting adaptation studies. Further, the potential synergy between adaptation and mitigation is assessed as an alternative solution to enhance countries participation in the climate change arena, with an illustrative case in the energy sector.

The Role of Adaptation in Climate Change Policy

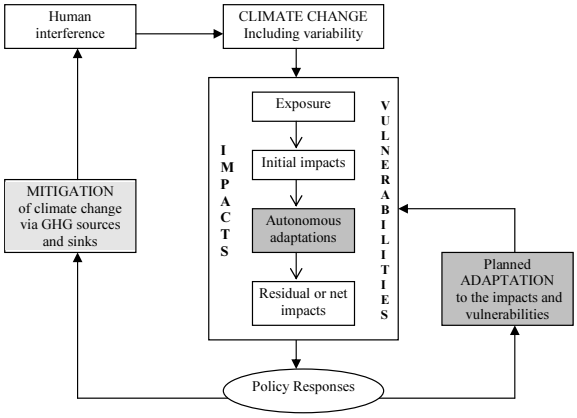
The concept of adaptation was recognised since the Intergovernmental Panel on Climate Change Third Assessment Report (2001). In that report, the emergent findings show that both natural and human systems are vulnerable to climate variability and change due to limited adaptive capacity in coping with changed climate. Energy is one of the main sectors which are sensitive to climate change and its vulnerability varies across geographical position, time, as well as economic, environmental, and social conditions. The role of adaptation within climate change policies is illustrated in Figure 1[1]. In this framework, adaptation is considered as a necessary policy response to complement mitigation in dealing with climate change.

Adaptation is defined as adjustment in ecological, social, or economic systems in response to actual or expected climatic stimuli and their effects or impact in order to lessen the damages or to take advantage of the opportunities associated with climate change. Understanding of this adaptation concept is important in assessing the impacts and vulnerability related to a given mitigation level and consequently the costs and benefits of the corresponding strategies.

Smit, et al (2000) proposed "an anatomy of adaptation" which elucidates three main questions with regard to adaptation[2]:

1. Adaptation to what? (climate-related stimuli).
2. Who or what to adapt? (corresponding systems and their characteristics)
3. How does adaptation occur? (adaptation types with regard to its process and outcome)[3].

Figure 1.
Adaptation as an Element in the Climate Change Issue (Smit, et al, 1999)



Evaluation of the adaptation policy should be carried out to understand the effectiveness of the chosen adaptation policy and to obtain more knowledge and input of the undertaken measures. This evaluation process answers the question of "how good is the adaptation?" based on criteria such as cost, benefit, equity, efficiency, urgency, and implementability. Some analytical tools that can be employed to assess adaptation options are Cost-Benefit Analysis (CBA), Cost-Effectiveness Analysis (CEA), and Multi-Criteria Analysis (MCA).

As can be seen from Figure 1, adaptation and mitigation are both the main responses in climate change policies. Within the mechanism of United Nations Framework on Climate Change Convention (UNFCCC), adaptation contributes to the goal of preventing dangerous human interference to climate in two ways[4]. Firstly, adaptation determines the extent of impacts which can be reduced for a particular mitigation level. In this sense, the higher the effectiveness of adaptation in reducing vulnerability, the less urgency is needed for mitigation, although adaptation will not totally avoid the occurrence of negative impacts. This point of view assumes that adaptation and mitigation have a substitutability relationship. Secondly, adaptation is also linked to the attainment of development goals and related policies by taking into account climate risks in the implementing activities. As mentioned in UNFCCC Article 4.4 that the developed country parties to the UNFCCC have committed to "assist the developing country Parties that are particularly vulnerable to the adverse effects of climate change in meeting the costs of adaptation to those adverse

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effects". In line with both ways, research conducted in adaptation also differs as discussed in the next section.

Approaches to Adaptation Studies

Burton, et al (2002) argue that there are two main approaches to adaptation:

Type 1 (First generation): impact-and-mitigation related adaptation studies

This approach stems from the first way of adaptation contribution in climate change policies. Most of research in adaptation is mainly conducted in this type 1 category. The direction of studies in this first generation adaptation is more impact-driven than vulnerability-driven. This direction is also called the adaptation research for mitigation policy. The emphasis of this approach is on assessing the gross and net impacts of a particular climate policy. Since the focus is on impact assessment and mitigation, the methodology employed is also related to that context. As the substitutability assumption is used, this first generation research will lead to trade-offs between adaptation and mitigation.

An example of the methodology used in this approach is the Seven Steps of IPCC guidelines or "Standard Approach" which uses only assumptions based on climate change scenarios and overlooks future adaptation choices and changes in socio-economic conditions. Some problems raised in using this approach relate to the first and second elements of anatomy of adaptation by ignoring the stakeholders'roles in adaptation (who or what to adapt?) and the conditions of the corresponding systems (adaptation to what?), which will be impacted and likely to change according to those impacts.

It is argued that type 1 adaptation studies can be inappropriate due to:

1) The impact assessment is not designed to take into account a range of adaptation options, especially at the public policy level.
2) The incorporation of adaptation into climate impact studies is based on assumptions about the adoption of possible measures, without considerations of the social and behavioural or other obstacles in the adaptation process.
3) Standard approach heeds less attention to the policy context of adaptation and key stakeholders' roles in reducing vulnerability.

In line with those shortcomings of the type 1 adaptation studies, the direction needs to be shifted more to type 2 adaptation studies which view adaptation as a process involving wider socio-economic human systems.

Type 2: Development-and-policy related adaptation studies

This more recent approach to adaptation embarks from the second viewpoint of adaptation contribution. This category is called adaptation research for adaptation policy, which focuses more on the integrated economic, environmental, social, and cultural approach in reducing vulnerability. The emphasis of this approach is how and where to deploy adaptation responses. The type 1 adaptation research includes more fundamental science such as biology, geophysics; while adaptation research for policy (type 2) has to be more responsive to economic, social, political, and environmental contexts. The adaptation framework must begin with an assessment of current policy, instead of future climate.

As adaptation involves more locally specific measures, it is fairly more difficult to assess the benefits of adaptation options with CBA analytical tools as in type 1 adaptation research because the impacts are more heterogenous in nature and more difficult to be compared in a common unit. With type 2 adaptation research, the top down approach used in type 1 adaptation research is not appropriate because the effective adaptation policy has to be responsive to a wide variety of economic, social, political, and environmental circumstances. Thus, what is needed is a common framework that should be considered in conducting research to reduce vulnerability, which involves:

a. Assessing current vulnerability to present day climate and the way existing policy and development practice can reduce the vulnerability.
b. Design of policy initiatives and alternatives and their assessment and prioritisation

The development of type 2 adaptation research does not state that type 1 adaptation research is not needed. It means that further research in type 2 adaptation studies should be conducted to ground adaptation research in real world context and to make them more responsive to the actual human systems in question. With type 2 adaptation research, more opportunities are open to integrate adaptation and mitigation efforts into more general development and climate policies (mainstreaming). Mainstreaming of adaptation policies is not only a more effective way to implement adaptation options but can also be the solution of deadlock between developed countries and developing countries in climate negotiation. Furthermore, there can be synergies to be gained in mainstreaming both mitigation and adaptation strategies as will be discussed in the next section.

Creating Synergy between Adaptation and Mitigation in the Energy Sector

The mainstreaming of adaptation and mitigation policies into higher development context needs to take into account the interrelationships between adaptation and mitigation strategies. In general, adaptation and mitigation measures share some similarities but also involves different features in implementation, mainly in effective temporal scale and spatial scale, estimation and comparability of costs and benefits, secondary benefits, the level of actors and types of policies in implementation, and the nature of public/private good elements. Thus, the design of any mainstreaming initiatives should consider those features and analyse how the implementation of each will affect the effectiveness of the other strategy.

Under the UNFCCC Developed Article 4.4, both the developed countries and developing countries should have

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Comments by Edgardo Curcio on Receipt of the Outstanding Contribuitons to the IAEE Award

I would like to thank the IAEE, especially Arnie Baker, for this most prestigious award given to me in recognition of my contribution to the energy sector in general and in particular to the International Association to which we all belong.

In the few minutes at my disposal, I would like to go over with you, in a few words, the long way the Association which I chair and I have come during these last years.

It was 1988 when I found out about the 10th International Conference of IAEE, which. was to take place in Luxemburg. It looked very interesting to me for the relevance of its themes and for the level of the speakers and I decided to participate. At that time I was General Manager of Agip, in charge of strategies and investments, and the oil and energy economic themes aroused my interest.

At the end of the conference I met some IAEE representatives, particularly Peter Odell, and I asked them why there wasn't an Italian Affiliate of the IAEE, considering that our country was very involved in energy problems. The answer was: it is difficult to deal with Italians and have precise and reliable answers: some contacts had already been established (and they gave me the names) but without any result.

I said I was willing to set up an Affiliate in Italy and I suddenly noticed in my interlocutors' eyes a flash of mixed scepticism and benevolence, which could almost be translated as their mistrust in my "adventurous" declaration of being able to do things where other people failed.

Back to Rome, I spoke with a few colleagues and friends who were also interested and involved in energy matters, about my idea to create the Italian Affiliate of IAEE, and they all agreed.

And I did even more. In order to understand how an Affiliate functioned I decided to go to London to find Jane Carter who at the time was Chairperson of the BIEE and I asked her advice, which she gave me in a very simple, effective way.

At my return to Italy, I gathered my friends and we founded the Italian Association of Energy Economists (AIEE). We were ten people (some of them are still AIEE members) who paid the fees and the expenses and also created a small fund, with our money, necessary to start our activity.

It was 1989. Two years later, very enthusiastic about this new activity, I decided to dedicate myself completely to the AIEE, becoming its President. To tell the truth, I was all alone, in a small room in an office shared with other people, doing everything by myself, with a part-time secretary.

Step by step, other members joined us, as Seminars and Conferences were organized and new contacts gradually developed. In 1994 I organized the second IAEE European Conference in Rome, which was a great success and an occasion for other national and international appointments. In 1999 AIEE organized in Rome the 22nd International IAEE Conference, with more than 300 participants from all over the world.

From then on, our Association started to grow and since 2000 it has developed a series of activities in various directions.

We have now become the 2nd IAEE Affiliate in number of members and, I suspect, the first for the range and quantity of its activity (seminars, conferences, Masters courses, consultancy, publications, etc).

Last year with the proceeds of our association, which is non-profit, we decided to create a Foundation, called The Energy Foundation, assigning it capital, a library and an ethical mission.

Today, the Energy Foundation gives scholarships to students and graduates, carries out studies and research and sponsors important events.

In the last months, we created an AIEE Student Section formed by graduates that participated in our university Masters courses. Today our Student Section has 33 members and some of them came to Potsdam with the contribution of the AIEE, to take part in the IAEE life.

Next year, as you already know, we will organize in Florence the 9th IAEE European Conference with the support of our Foundation.

In conclusion, I would like to say that thanks to the IAEE I found a better way to express my interest in energy economics and, at the same time, I think I gave my contribution to the growth of this important institution, to make it known in our country and abroad, and to the dissemination of energy culture.

I thank again all the persons who selected me to receive this award, which is very important to me, and I hope to meet all of you next year in Florence, one of the most beautiful cities in the world, where I will help you discover how the culture of energy may live in harmony with the culture of art and good food. **Thank you all again.**

Careers, Energy Education and Scholarships Online Databases

IAEE is pleased to highlight our online careers database, with special focus on graduate positions. Please visit http://www.iaee.org/en/students/student_careers.asp for a listing of employment opportunities.

Employers are invited to use this database, at no cost, to advertise their graduate, senior graduate or seasoned professional positions to the IAEE membership and visitors to the IAEE website seeking employment assistance.

The IAEE is also pleased to highlight the Energy Economics Education database available at http://www.iaee.org/en/students/eee.aspx Members from academia are kindly invited to list, at no cost, graduate, postgraduate and research programs as well as their university and research centers in this online database. For students and interested individuals looking to enhance their knowledge within the field of energy and economics, this is a valuable database to reference.

Further, IAEE has also launched a Scholarship Database, open at no cost to different grants and scholarship providers in Energy Economics and related fields. This is available at http://www.iaee.org/en/students/ListScholarships.aspx

We look forward to your participation in these new initiatives.

The Turkish Association for Energy Economics

The Turkish Association for Energy Economics (TRAEE) was founded on February 15, 2005, in Istanbul by a group of academicians from all over Turkey as a non-profit professional organization. Even though the founding members have all been of academic origin, TRAEE aimed to become an effective non-governmental organization in the energy sector by enrolling predominantly energy professionals from the sector. This has partly been achieved through a rapid growth over the last year. The current member profile of the association is as follows: 90 individual members, 40% of which are of academic background and 15% of which are students. Thus, the majority (45%) of the members are professionals from private and public institutions. There are four institutional members including private sector market leaders in petroleum products distribution, electricity distribution, electricity production, and environmental protection and waste materials valuation. The bid that TRAEE has made to organize an upcoming international conference is expected to boost both the local and IAEE membership numbers through increased exposure and interaction that the international conference will provide.

Among ongoing activities of TRAEE are working group initiatives, seminars, energy talks, and an electronic forum for professional discussion.

Any member in good standing can propose the establishment of a working group. There are currently three working groups working actively on the following topics:

- Willingness to Pay for CO_2 Emission Reduction in Turkey
- Emission Certificate Trading Opportunities for Turkey
- Applicability of GEF funds for Projects from Turkey

Working groups start out as more or less informal discussion groups, but have the potential to turn into more involved collaboration through developing joint project and research proposals. In fact, two of these working group activities have recently resulted in joint research projects proposed to and accepted by the Scientific and Technological Research Council of Turkey.

In the last year, TRAEE organized two seminars and three energy talks. The seminar topics were:

- Sustainable Development in Turkey: Exergy Conscious Optimization Requirements of the Energy Sector; *presented by Prof. Dr. Birol I. Kılkış Fellow ASHRAE, Distinguished Lecturer, Watts Radiant & Green Way Intern., Vienna, VA.*
- World Energy: Needs and Requirements; *presented by Prof. Dr. Jack Barkenbus, Executive Director, Energy, Environment and Resources Center, The University of Tennessee.*

The energy talks are more informal than seminars and do not necessarily involve a presentation nor a topic. The aim is to provide a forum for exchanging news and views with an invited guest about topical issues on energy economics. The first three talks have attracted quite a lot of attention. Invited guests included the general manager of Turkey's leading petroleum product distribution company, the Chairman of the Energy Commission of the Turkish Parliament and a professor working on electricity market reform. Detailed information on past and prospective activities is regularly posted on the local website of TRAEE (http://www.traee.org), including transparencies of the seminar presentations as well as press reports on both the seminars and energy talks.

TRAEE places special importance on the growth of student membership and has formally agreed upon establishing a student chapter at its last Executive Committee meeting.

The picture below shows Executive Committee members together with student representatives at the party to celebrate TRAEE's 1st birthday.

From left to right: Prof. Ilhan Or (Treasurer); Nihan Karali (Student representative), Assoc. Prof. Yıldız Arıkan (Member); Assoc. Prof. Gürkan Kumbaroğlu (President); Assoc. Prof. Filiz Karaosmanoğlu (Vice President), Kemal Sarıca (Student representative) and Assoc. Prof. Ünal Zenginobuz (Member).

Book Review

Sustainable Fossil Fuels: "The Unusual Suspect in the Quest for Clean and Enduring Energy", by Mark Jaccard, Professor Simon Fraser University, Vancouver. (Cambridge Univ. Press, U.K. 2005). 380 pages, ISBN – 13 978 – 0 – 521 – 86179 – 3 hardback (or 4 for paperback).

This book should become required reading for those trying to reconcile the impact of energy on climate change and the developing countries need for economic advance.

The author is well placed to deal concurrently with these issues and does so, as one review has already noted on the sleeve jacket, in an optimistic fashion – in itself a refreshing rarity. Coming initially from an IPCC involvement and then to economic development programmes, Jaccard deals even-handedly with the needs and interactions of both these issues and does so in a clear and easy to read style that gives the reader a sense of direct dialogue while never allowing the main thrust of the book to become obscured by detail. This is no mean feat since the main thrust is no less than an overview of potential energy needs and their environmental implications to the end of this new century. So despite containing some three dozen tables and figures the numerate content in the text is kept to a minimum compatible with the conversational style. The key to this is to maintain a top-down holistic perspective. The key elements in this holistic approach are the author's previous knowledge of IPCC scenarios, current wisdom on targets for CO_2 emissions, demographic trends from the UN and others and business-as-usual energy projections required if the developing world is to aspire to parity with average OECD living standards (that is to say European levels rather than USA).

There are of course enormous uncertainties, but according to Chapter 2, p.45 the aim is "not to get too fixed on specific numbers. This only leads to disagreements when what is important is the big picture". The same paragraph goes on to assert that alternative estimates will "show that our energy system is headed for dramatic expansion…….whether the exact size is doubling or quadrupling, most observers would agree that the system is likely to be significantly larger in 100 years……that is sufficient for the rough assessment of system sustainability …. at the end of this chapter". The intention here is to give a dimension, not precision, to the size of the task in reconciling the need to contain the rise in CO_2 emissions with the business-as-usual consequences of energy growth. And although other forms of energy related pollution are considered – the subtitle of the book refers to "the Quest for Clean and Enduring Energy" – the CO_2 implications of the energy supply needed to meet any targeted level of demand are at the nub of this book. Because the sheer volume of energy required is so vast that we are going to need everything we have got, or are going to have available, so either quantity overrides environmental quality or the target for sustainability in economic and demographic terms is left in crisis. This will be anathema to those with strong dislikes of various forms of energy.

However there are other seemingly inevitable implications of a bitter-sweet nature for proponents of all "exclusive" solutions. Despite a projected tenfold increase in nuclear power – beyond which is considered infeasible in this century – proponents of renewables will be consoled by the projection that their contribution will be 400% larger than nuclear by the end of the century (again, more is only considered feasible after 2100). However they will have to balance this with the likelihood that two-thirds of global energy in 2100 may have to come from fossil fuels and that as oil and natural gas are also seen to have feasible limits the lions share will fall upon coal – a reminder of the trend for fossil fuels to become heavier, dirtier, more carbon intensive as resort has to be made to lower quality liquids and solids and impurities in gases.

If this seems an unnecessary turn towards "dirty" fuels out of some perverse choice, may I point out that the total renewables predicted for 2100 by this current trends scenario offered by Jaccard is equal to total world energy consumption a decade ago. Today, apart from hydropower, the BP Statistical Review cannot graphically depict the role of renewables in the total mix because it is too small to be visual. Contrast the two and consider whether Jaccard is frugal or lavish with his renewables projection.

The clear message is that further growth in fossil fuels is as unavoidable as the need to do something radical to alleviate the effect of this growth upon climate change; so while it is unavoidable it is not insuperable if instead of trying to rely solely upon alternatives the problem with fossil fuels is tackled head-on with a global carbon capture programme. This is the core message of this book.

For me, the core of this book is in this Chapter 2. After an opening chapter clarifying "energy sustainability" Chapter 2 asks if our current energy path is sustainable. The next three chapters deal with (3) the prospects for clean secondary energy focusing equally on electricity and transport fuels including hydrogen; (4) the potential for increased energy efficiency, nuclear; renewables; and (5) the issue of depletion of fossil fuels. Chapter 6 goes on to ask if we can develop technology and economic incentives/instruments to clean up fossil fuels and to give an assessment of the practicality of storing CO2 in ultra large volumes on the planet: the geological answer is that sub-aquifers etc. are available if the logistics and incentives are developed.

It is worth noting that in conversation earlier this year Jaccard looked to Europe as a leader in such developments viz: the EU trading system for carbon permits to establish commercial values and incentives for carbon reduction between member states and their key industries: the UK/Norwegian accord to promote a program of carbon capture for hydrocarbon producers in the North Sea: the stick-and-carrot tax regimes such as in London whereby hybrid cars and LNG (yes LNG) powered heavy road transport vehicles are exempted from the central area traffic Congestion Charge of US$12 per day and economy cars generally pay less annual vehicle road tax. Interesting as these are I had to point out

we were at an early stage and that our tendency was still to keep a close eye on the US and California in particular for transport developments.

The next two chapters draw the threads together for a sustainable and environmentally compatible energy programme: Chapter 7 deals with the options and Chapter 8 with the thorny problem of a future policy framework .Suffice to say that the holistic thrust of the approach is maintained throughout, including in each chapter a "warm-up" resume of what has gone before. Indeed it is possible to perceive each of the eight chapters as a "stand alone" and with the directness of approach to the reader redolent of a series of interconnecting lectures. The logic is trailed across each chapter that this interconnection is vital so as (and I repeat the quote) "not to get too fixed on specific numbers" (or indeed specific topics) "when what is important is the big picture".

In the final chapter (9) there is a note of warning that in the truly long term sustainability of systems is not just about energy so that energy sustainability might have to accommodate itself to the wider perspective. This may be so: but happy the day when, having perhaps achieved energy sustainability and climatic stability, we can focus directly on such problems.

Meanwhile the hope that Mark Jaccard's book will achieve the wide circulation and discussion it merits will, if realised, help to cut through the myopia, special interests and public confusion that tend to obscure and delay the essential progress that is already within our potential grasp without the need for any radical technological fix. Such optimism is justified provided we recognise one key element of shortage: time.

Tony Scanlan, London 2006

Adaptation and Mitigation Synergies *(continued from page 32)*

interest in adaptation. However, currently developed countries have very low interest in undertaking adaptation due to the fact that they assume they have the financial and technical resources to adapt as and when necessary. On the other hand, developing countries, which are mostly more vulnerable to climate change and variability due to both the condition of their natural systems and lower adaptive capacities, view the UNFCCC mechanism as an opportunity to get international funds to finance their development activities. If the mechanism of Adaptation Fund is obligated to developed countries, they will also have the need to ensure that the funds will be used in the most efficient way. On this ground, there is an opportunity to create an integration of adaptation and mitigation measures to higher development agenda in an efficient way.

A case of integrated development and climate change policies in Sub-Saharan Africa illustrates how development activities for food and energy security to achieve Millenium Development Goals can also have positive climate impacts in the region[5]. Another case in Canada shows that the implementation of mainstreaming policies produced synergies both between mitigation and adaptation. This example shows how developed countries can take the full benefits of anticipatory or planned adaptation. In Canada, a number of initiatives have been generated for integrating adaptation and mitigation measures[6]. Some initiatives that have both positive adaptation and mitigation effects are:

- Change urban development pattern to higher densities and mixed uses in urban areas, thereby reducing embodied emissions from infrastructure and from commuting transport
- Maintain or improve operating energy performance requirements of new and existing buildings through regulation (e.g., the Model National Energy Code for Buildings) (NRC/CNRC, 1997)
- Develop new generations of high-efficiency chillers/ cooling systems
- Improve the energy efficiency of buildings in operation through training and education in improved management and maintenance techniques

While some of the initiatives in adaptation measures are initiated by government, some of them are created by market forces. Most of those adaptation measures are compatible with mitigation measures. By recognizing some of the possible negative effects of adaptation to mitigation from the beginning, the synergy will most likely occur.

Concluding Remark

Most of the adaptation research are closely linked to impact and mitigation studies (type 1 adaptation studies) and thus are undertaken using the same approaches. As adaptation issues embrace wider socio-economic human systems, more research should be conducted toward adaptation policies research (type 2 adaptation studies). Furthermore, this latter type of adaptation research also opens more opportunities to integrate adaptation and mitigation measures into a higher development agenda and to create synergies between both measures. Some initiatives of integration policies in Canada show that there is a large potential in creating synergies between both strategies.

Endnotes

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