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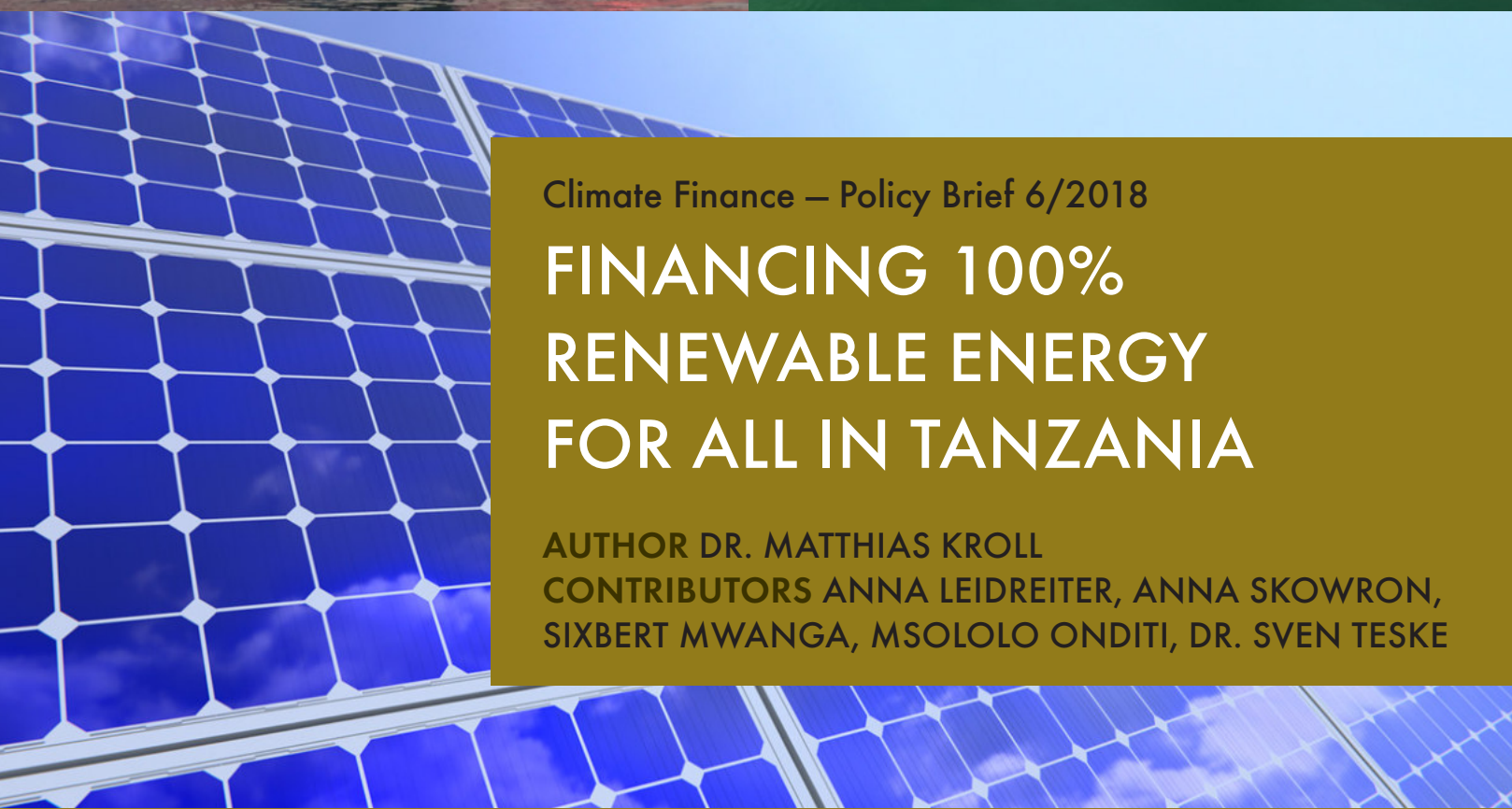

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FINANCING 100% RENEWABLE ENERGY FOR ALL IN TANZANIA

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ABSTRACT
Tanzania is endowed with abundant, high quality renewable resources which could play a significant role in meeting the country's energy demand and propel living standards to the level of industrialised countries by 2050. This means however, that an average annual investment of US$9 billion is needed, to reach the 100% Renewable Energy (RE). In order to provide 100% RE which is affordable for all, additional financial means are necessary. A new model focusing on an agreement between MDBs and Central Banks from the industrialised world outlines how to unlock this necessary investment to implement 100% RE for all by 2050.

1. INTRODUCTION

In 2015, world leaders signed off on a new global 15-year plan to tackle poverty inequality and climate change. In the Agenda 2030 with its Sustainable Development Goals (SDGs), they pledged to ensure that all people have access to affordable, reliable, sustainable and modern energy. Only 3 months later, in December 2015, all nations committed to limit global warming to 1.5 degrees Celsius and hereby set a deadline for net zero greenhouse gas emissions in the second half of this century. To reach this, national governments are invited to communicate by 2020 their mid-century, long-term low greenhouse gas emission development strategies. This essentially requires countries across the world to develop an adequate 100% Renewable Energy strategy.

Fossil fuel infrastructure becomes "stranded assets"

It is estimated that more than 80% of the known deposits of coal, 50% of gas and one third of the oil reserves cannot be used for energy production, if global warming is to be kept well below 2°C[1]. To comply with the 1.5°C limit agreed in Paris, these estimates become significantly higher. This would mean that the complete fossil infrastructure like power plants and oil refineries and a large part of the raw material reserves in the balance sheets of energy companies become worthless. Assets whose value results from e.g. gas production will become stranded, if the gas has to be left in the ground. With a global shift towards renewable energies, a massive part of fossil fuel related assets in the balance sheets of banks, insurance companies and energy producers are threatened from losing their value. To identify these assets, the G20 Financial Stability Board (FSB) has implemented a Task Force on Climate Related Financial Disclosures (TCFD)[2] to disclose the existing fossil fuel stranded assets and warned for investing in new fossil energy production assets.

Opportunities to leapfrog

For Global South countries with little access to energy services, this is however an opportunity to leapfrog fossil fuels and use renewable energy as a tool for poverty eradication and socioeconomic development. In 2016, almost 50 countries from the Global South, united in the Climate Vulnerable Forum, officially committed to "strive to meet 100% domestic renewable energy production as rapidly as possible while working to end energy poverty, protect water and food security, taking into consideration national circumstances". One of them is Tanzania.

And indeed, Tanzania is endowed with abundant, high quality renewable resources, which could play a significant role in meeting the country's energy demand. A recent study proved that with 100% RE, Tanzania can provide universal access to reliable energy for all its citizens, while increasing living standards to the level of industrialised countries by 2050[3].

By 2020, the share of renewable electricity production can already be at 53%, and increase to 75% by 2030 and 100% by 2050. In terms of installed capacity, this would mean about 20 GW in 2030 and 60 GW by 2050. New gas power plants will operate within around 20 years, while the financial write-off time is calculated with 10 years, therefore avoiding stranded investments. In the thermal sector, sustainable renewable energy technologies can provide 90% of Tanzania's total heat demand in 2030 and 100% in 2050, which would be about 119 GW in terms of installed capacities. Energy efficiency measures help to reduce the currently growing energy demand for wood fuel for cook stoves and shifts 100% to modern sustainable biomass, solar and geothermal heating, as well as electric cooking and heating by 2050.

Tanzania's transport sector can be decarbonised by 2050 with 75% coming from renewable electricity,

1 See: Christophe Mc Glade; Paul Ekins: The geographical distribution of fossil fuels unused when limiting global warming to 2 °C, in: Nature, January 2015. http://www.nature.com/nature/journal/v517/n7533/full/nature14016.html
2 See: Task Force on Climate-related Financial Disclosures (TCFD); https://www.fsb-tcfd.org/
3 Teske, S., Morris, T., Nagrath, Kriti (2017): 100% Renewable Energy for Tanzania – Access to renewable and affordable energy for all within one generation. Report prepared by ISF for Bread for the World, October 2017

despite population increase, GDP growth and higher living standards. This would increase the required installed capacity of renewable electricity to 133 GW. Overall, Tanzania has sufficient renewable energy resources to keep storage shares well below 20% while securing supply of 100% renewable energy for all 24/7. Tanzania´s annual per capita emissions will remain at 0.2 tonnes while the population continues to increase and standards of living rise to the level of a middle-income country.

100% RE for all Tanzanians by 2050 costs US$9 billion per year

The estimated total cost for the required investments until 2050 are US$310 billion. This means an average investment finance need of US$9 billion per year.[4] The estimated average price per kilowatt hour is about US$0.15/kWh, which translates today into about 340 TZS. This price is above the current average electricity price in the country and much above the reduced price of 100 TZS/kWh for small energy customers (0-75kWh).[5] According to Tanzanian energy experts, an energy price of 70 TZS/kWh could be regarded as affordable for all Tanzanians, including low income and small energy customers.[6] While the introduction of renewable technologies may increase the costs of electricity generation around 2025 or 2030 by about 1.4 - 1.7 cents/kWh, it would become cheaper by about 4.5 cents/kWh around 2050, when 100% RE is reached. In order to implement 100% RE for all in Tanzania by 2050, the government must therefore overcome two key challenges: 1) mobilising the necessary capital for the upfront investment; and 2) ensure affordable energy prices for all consumers.

This paper aims at demonstrating, how a new finance tool that builds on the mandate of central banks can help the Tanzanian government to overcome these challenges. Thereby, Tanzania can not only harvest the first mover advantage, but also pioneer implementation of the Paris Agreement and Agenda 2030, particularly SDG7.

2. CURRENT BARRIERS TO FINANCE 100% RE IN TANZANIA

Tanzania is one of the world's poorest economies in terms of per capita income, averaging US$ 864.90 per year, which is equivalent to less than 9 percent of the global average. Though its per capita income is slightly ahead of the average per capita income of low income countries (US$615.60), it remains significantly below lower middle-income countries (US$1988.20) and even further from middle income countries (US$ 4736.70).

Only 16.9 percent of rural households in Mainland Tanzania are connected to any form of electricity as compared to 63 percent of urban households[7], and only 1 percent is able to use electricity for cooking. This situation is seriously constraining the potential for growth and level of earnings of the population. Above and beyond, the poor spend about 35% of their household income on energy while the better-off spend only 14 percent.[8] And, even those connected to the grid opt nevertheless for burning cheaper biomass in an attempt to avoid paying high electricity prices.

Financial barriers to scaling up renewable energy in Tanzania are primarily associated with the lack of clear long-term financing mechanism with overdependence on donors and public funding, high perceived risks and up-front capital costs and long payback time[9]. As in most developing and emerging economies, the main barrier to finance 100% RE for all in Tanzania is not a

4 Ibid. p.64.
5 See: TANESCO; www.tanesco.co.tz/
6 See: TANESCO; www.tanesco.co.tz/
7 The United Republic of Tanzania (2016) "Energy Access Situation Report"; https://www.nbs.go.tz/nbs/takwimu/rea/Energy_Access_Situation_Report_2016.pdf
8 World Future Council, Policy Roadmap for 100% RE and Poverty Eradication in Tanzania (2017)
8 World Future Council, Policy Roadmap for 100% RE and Poverty Eradication in Tanzania (2017)
9 Ibid (2017)

lack of investment capital, but a lack of bankable projects which could attract investors.[10] In fact, most available investments like Green Bonds require repayment and usually high interest rates.

Further, almost all equipment for a 100% RE infrastructure must be imported to Tanzania.[11] Therefore, the bulk of investment is needed in foreign currencies and consequently high repayment, including interest rates, have to be carried out in foreign currencies. In macroeconomic terms, Tanzania therefore has to increase their exports to cover the increased imports of the RE equipment, which would not be financed through grants, to balance their current account. The fortune is that these imports are largely one-time imports, because the installed RE harvests domestic renewable energy sources and thus do not cause further import costs for fuel.

To overcome these barriers and ensure affordable energy prices for all consumers, it is necessary to finance a significant part of the upfront costs with grants. Given the population´s income level and the economic situation in Tanzania, about 50 to 75 percent of the necessary investment should be financed through grants, which is about $4.5 to $6.75 billion. The remaining sum can be financed by private investors who must be backed with guarantees to lower interest rates. If per capita income is growing over time and higher energy prices are affordable for all, the share of necessary grants could decrease.

This shows that existing finance mechanisms do not sufficiently address the key challenges and the main question for Tanzania remains: how to unlock the necessary investment to implement 100% RE for all by 2050? The following chapter introduces a new financial tool that builds on the engagement of central banks and could provide some solutions.

3. UNLOCKING BILLIONS BY ENGAGING CENTRAL BANKS

As demonstrated during the financial crisis 2008, Central Banks are the most powerful economic institutions in our current economic system, because they are the producer of the legal tender (in their countries) and the lender of last resort for the banking system. Central banks cannot become insolvent in their own currency and were therefore able to finance a bailout program for the struggling banking system. Thus, 10 years after the global bank bailout, we now need the engagement from the Central Banks for a 'climate bailout', which essentially facilitates the transformation to 100% RE.

10 IRENA; Scaling up renewable energy investment in emerging markets, January, 2018, p. 3. (white paper), http://irena.org/-/media/Files/IRENA/Agency/Articles/2018/Jan/Coalition-for-Action_Scaling-up-RE-Investment_2018.pdf?la=en&hash=43CD877460274F1BEA5C61444AC4B20C59A57702

11 It is important to note that this would also be the case for fossil fuel infrastructure development.

The role of the guarantees

As outlined above, available risk calculation methods often lead to neglecting RE –investments, despite their potential profitability. While credit guarantees from MDBs can lower the risk and thus interest rates they also have significant limits to unleash the full potential of RE. Therefore, Central Banks must cover the bulk of the risk of the guarantees. MDBs could bundle RE-investments to generate a bond with a homogeneous risk category. Thus, the MDBs create a new standardised and low risk asset category which could be issued to private investors: The 'Central Bank Backed Climate Bonds' (CBBCBs).

The guaranties of a Central Banks can hereby justify interest rates at the level of AAA government bonds (e.g.: 1.5% or 2.5%). This low interest level would unlock a huge amount of additional RE-Investments. The low interest level leads to lower investment costs and thus can be used to sell the newly produced renewable electricity at a price, which makes it 'affordable for all' (in line with the SDG 7). The CBBCBs would transform RE-Investment into a low risk, long term and sustainable investment. Central Banks would only get involved in the case of a default. The impact for their balance sheets would be small.

'Standardised Green Climate Bonds' (SGCBs) to unlock new money

Some RE projects do not only require a guarantee to gain profitability, but a one-time or permanent grant. As mentioned above, this is the case to implement 100% RE for all in Tanzania as this is the only alternative to ensure affordable energy for all citizens. In this case MDBs, the GCF (Green Climate Fund) or any other designated financial institution can issue standardised and virtually perpetual Green Climate Bonds to one (or several) Central Bank of an industrialised country. These `Standardised Green Climate Bonds´ (SGCBs) establish a new asset class for Central Banks, as only they have the ability to purchase virtually perpetual (e.g. 100 years or longer) bonds with very low (if any) interest rates. The new capability of the MDBs to receive new and virtually repayment-free money by issuing `Standardised Green Climate Bonds´ to the Central Banks opens new possibilities to fund many additional RE-Investments because with that, MDBs gain more leeway to give grants.

Due to their perpetual duration, SGCBs would become permanent assets of the Central Banks and thus form the foundation of regular money creation. This would ensure that the GCF or MDBs are at the receiving end of new and non-repayable money with which they can co-fund and thus increase the attraction of many climate protection investments.

Considering the current actions of Central Banks in industrialised countries, up to $300 billion p.a. could easily be generated globally within the regular money creation process.[12] Thus, the average needed $9 billion per year for Tanzania could be financed easily. Especially if a part of the needed $9 billion should be financed with private money and not through grants.

Ideally, all UNFCCC member states and their Central Banks should participate in this new Standardised Green Climate Bond system. To kick-start and test the tool, such bonds could be initiated by a small group such as the Climate Vulnerable Forum members and their industrialised partners. Tanzania could pioneer this to harvest the first mover advantage. The benefits for participating governments in industrialised countries would be that Climate Bonds purchased by their Central Banks could count towards their promised contribution to the $100 billion p.a. climate fund (agreed at COP16 in Cancun), without having to invest

12 See: World Future Council; Unlocking the trillions to finance the 1.5°C limit, Future Finance – Policy Brief 09/2017, https://www.worldfuturecouncil.org/file/2017/11/WFC-Policy-Brief-09_2017-Unlocking-the-trillions_Merged-Version-1.pdf

tax-generated funds. In the real economy, such additional money for 100% renewable energy and the resulting consumption would not lead to inflation, since it would be globally distributed. The IEA has estimated that approximately $1 trillion p.a. in additional investments would be required to limit global warming to 2°C.[13] Even if new money creation to achieve the Paris 1.5°C goal succeeds in stimulating total investments and thus an additional demand of up to $2 trillion p.a. (including participating private capital), this would be a small stimulus package rather than an inflationary risk when seen in relation to the global economic output of around $80 trillion dollars. Of course, the total required sum would be less if RE prices continued to fall. While this is concerning the global situation, the global inflation risk could even neglect, if only Tanzania applies the tool.

Identifying adequate partners for Tanzania

SGCBs should mainly be sold to Central Banks of the countries which produce and deliver the RE equipment. Hereby, Central Banks will also boost their own domestic economies. To identify adequate Central Banks for the government of Tanzania to partner with, two aspects are necessary to consider: First, it needs ideally Central Banks of countries which produce at least parts of the needed RE equipment. Second, it needs a basic political will in the partner country as well as the awareness of its Central Bank that tackling climate change is within their mandate as climate change threatened global financial stability.

Central banks which have the necessary monetary reach and capabilities to tackle climate change by buying SGCBs at a global level and fulfil at least the first criteria and are e.g.:

- The Peoples Bank of China
- The Bank of Japan
- The Reserve Bank of India
- The European Central Bank
- The Federal Reserve System (Fed)
- The Bank of England

However, also smaller Central Banks could be considered to be involved in supporting the SGCBs financing process.

Tanzania's home work

As a key prerequisite for implementing this tool successfully, Tanzania has to establish a robust and reliable policy framework, overcoming current policy and governance barriers.[14] Such a framework must reflect the government's commitment to scale up RE and provide energy access for all as well as provide the necessary investment security for different stakeholders to engage in this transition.

Key policy elements of such a framework are:

- Identification of necessary RE investments in terms of infrastructure and technology requirements, based on the analysed potential of all renewable energy technologies[15]
- A reasonable RE target which is in line with international pacts such as the Paris Agreement, the Climate Vulnerable Forum Declaration and the Sustainable Development Goals (SDGs)
- Purchase obligation for all renewable energy sources
- Support of decentralised, distributed renewable energy such as mini-grids and stand-alone systems
- Empowerment of households and citizens to pro duce, store and distribute energy
- Guaranteed access to the grid for all
- Grid priority for renewable energy
- Empower new business models and stakeholders to enter the market
- Energy efficiency
- Development simple and efficient administrative procedures

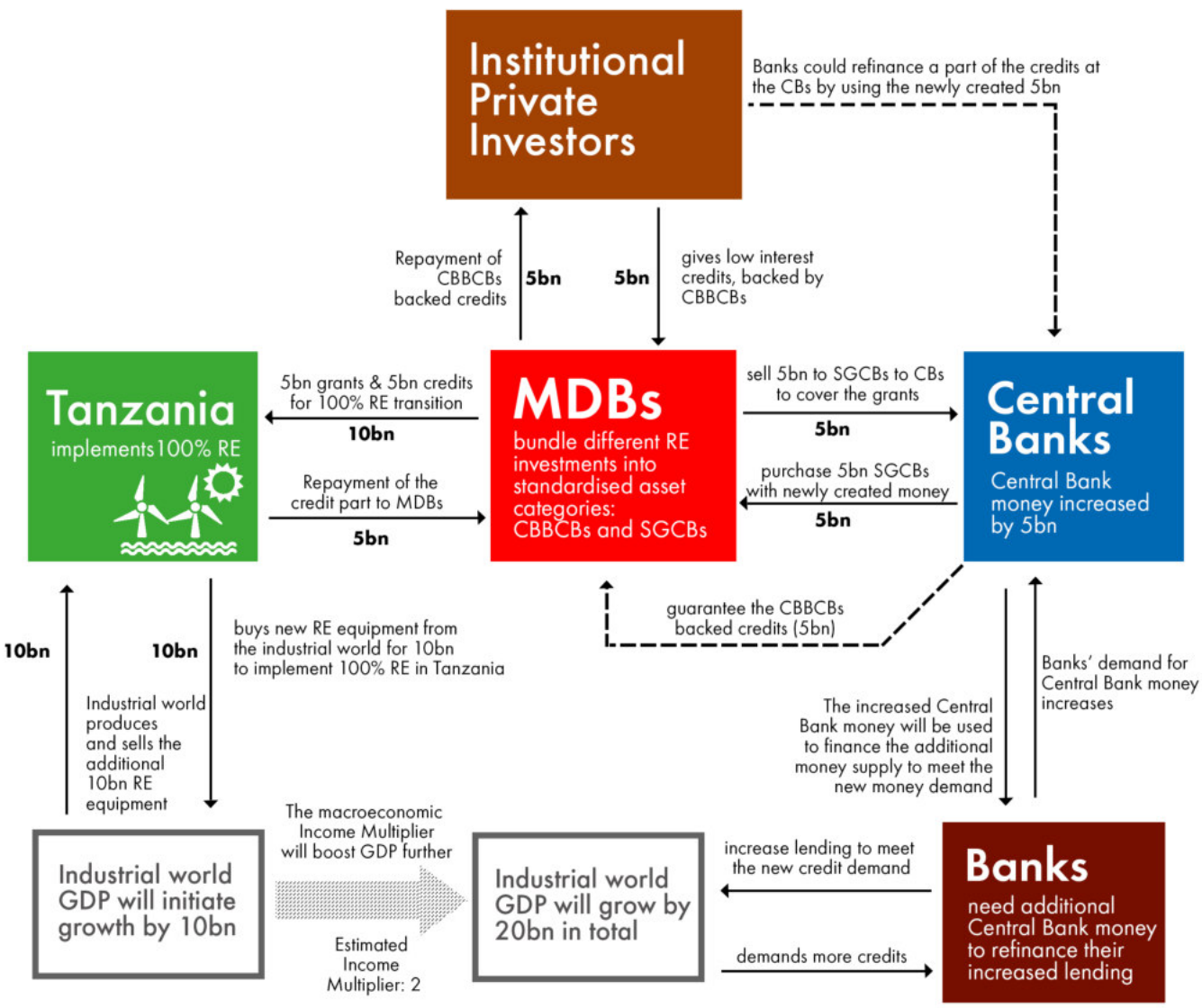
13 cf. Figueres, Christina in The Guardian of 14.1.2014, http://www.theguardian.com/environment/2014/jan/14/un-climate-chief-tripling-clean-energy-investment-christina-figueres

14 World Future Council, Policy Roadmap for 100% RE and Poverty Eradication in Tanzania (2017)

15 This could be guided and informed by the scientific study from Teske, S., Morris, T., Nagrath, Kriti (2017): 100% Renewable Energy for Tanzania – Access to renewable and affordable energy for all within one generation. Report prepared by ISF for Bread for the World, October 2017

100% RE implementation in Tanzania – the financial flows between MDBs, Central Banks and private investors

– how the new Central Bank money is used: boosting the real economy instead of feeding a new asset price bubble



ABBREVIATIONS

CBs: Central Banks
MDBs: Multilateral Development Banks
SGCBs: Standardised Green Climate Bonds
CBBCBs: Central Bank Backed Climate Bonds

4. THE RESPONSIBILITY OF INDUSTRIALISED COUNTRIES AND THEIR CENTRAL BANKS

Combating climate change and therefore building up an energy infrastructure based on 100% RE is a global duty. However, already at the Earth Summit in 1992, governments acknowledged disparity of economic development between industrialised countries and the Global South. The concept of Common But Differentiated Responsibilities (CBDR) was established, which is based on the relationship between industrialisation and climate change. The more industrialised a country is, the more likely that it has contributed to climate change by high emissions. Therefore, there is a universal agreement that industrialised countries contributed more to environmental degradation and should have greater responsibility than developing countries. It follows the idea of a polluter-pays principle where historical contribution to climate change and respective ability become measures of responsibility for environmental protection.

Today, climate change is already a systemic risk for the financial system and hence for the global economy. Considering the scale of the climate crisis, only economies – hence including Central Banks – of industrialised countries have the power to meet this challenge. Central banks are public institutions in charge of providing legal tender and maintaining financial stability. In most cases they are also mandated to support the public good (including a healthy environment), provided that this does not prevent their operating an independent monetary policy. Climate Change is a new duty for Central Banks says Bank of England.[16] Protecting the environment is also a mandate of the ECB.[17] The support of the Central Banks of industrialised countries will not burden their taxpayers, thus the contribution could be significantly higher than a finance scheme which would burden public budgets. Finally, purchasing SGCBs would not lead to Central Banks losing the ability to operate an independent monetary policy.

A historic perspective on the role of Central Banks

The traditional task of Central Banks was quite narrowly defined before the 2008 financial crisis. Besides providing the economy with legal tender, managing inflation was key. Since the financial crisis, and due to growing deflation, Central Banks have been compelled to use other economic tools and been given more responsibility for the overall stability of the financial system. The Bank of England has now stated explicitly that the risk to the stability of the financial system from climate change is a new responsibility of Central Banks.[18] The purchase of SGCBs would therefore be a consistent next step for a Central Bank policy in fulfilling its mandate.
In the case of Europe, protecting the environment is part of the mandate of the ECB. Based on article 127 (TFEU), one of the aims of the ECB is to support the objectives of the EU in article 3 (TEU):

TFEU, article 127: "Without prejudice to the objective of price stability, the ESCB shall support the general economic policies in the Union with a view to contributing to the achievement of the objectives of the Union as laid down in Article 3 of the Treaty on European Union."

TEU, article 3, para 3: "…a high level of protection and improvement of the quality of the environment."

There is no reason to assume that purchasing Standardised Green Climate Bonds in the proposed amounts by the ECB would seriously harm price stability. Also, buying bonds from MDBs or other designated financial institutions by the ECB is not forbidden by article 123 (TFEU). Only the direct purchase of government bonds is forbidden.

16 cf. Bank of England, One Bank Research Agenda, Discussion Paper, 25. February, 2015, p. 30 ff.
17 See: Art. 3 TEU and Art. 127 TFEU
18 cf. Bank of England, One Bank Research Agenda, Discussion Paper, 25. February, 2015, p. 30 ff.

Central Banks are the most powerful financial institutions in our current economic system. Climate breakdown would seriously harm not only the environment but also economic and financial stability. Therefore, they have the duty to do what they can to prevent climate breakdown.

Central Banks are mandated to provide their currency area with sufficient legal tender. In ordinary times (e.g. with a real growth rate of 3% and an inflation rate of 2%, i.e. nominal growth of 5%) they can meet demands for additional money of up to 5%, without this money creation leading to imbalances or speculative bubbles. An expansion of the money supply analogous to the real financing needs of a growing economy is naturally sustainable.[19]

To meet additional demand for money and to inject it into the economy, Central Banks give - usually very short term - credit to banks or buy government or private bonds of differing maturities from them. During ordinary economic times there is likely to be nominal monetary expansion and growth in Central Bank assets. Central Banks can afford to additionally include very long-term bonds in their balance sheets without it constraining their (monetary) room for manoeuvre. This means that it is possible to integrate the purchase of long-term SGCBs (issued by MDBs or other dedicated institutions) into the money creation process without it requiring a fundamental change of Central Bank policy. The current independence of Central Banks would not be affected by such a new "QE for climate" programme.

If we assume that in the future, nominal, global growth will average 5%, the yearly global growth of the money supply must also be around 5% to avoid restrictive effects on the real economy. The two largest Central Banks, the US Federal Reserve and the ECB, could (with $5tn as their total monetarily effective balance sheet total[20] and a long-term money creation requirement of 5%) potentially create $250bn per year without causing inflation and could use this to purchase perpetual SGCBs. As the dollar and euro zones together account for 36% of global GDP, the total sustainable money creation potential of all Central Banks can be estimated at $700bn.[21]

'Standardised Green Climate Bonds' boost economies

When Central Banks buy new SGCBs and record these in their balance sheets, they also gain a new monetary policy tool. The advantage of this new tool is that it leads directly to the purchase of new goods and services. The real economy is thus stimulated without a need for the usual detour of credit creation by private banks. This means that no new debtors and creditors need be found. The new money is created, debt-free. The disbursal by the MDGs for the new RE equipment would be directly fed into the system of the nation's banks, and their reserves at the Central Bank would rise. Should excess reserves result, the banks could reduce these reserves by lowering their refinancing at the Central Bank. The money supply would thus fall again. Banks would reduce their reserves at the Central Bank, which they do not need to refinance

19 It was unsustainable to provide for the financial sector's enormous demand for money for speculative purposes since the deregulation of the financial sector. But Central Banks could not stem excess demand for credit without simultaneously throttling growth- given that they only had the setting of lending rates as their sole policy tool.

20 Thanks to the various measures used by Central Banks to manage the financial crisis, their balance sheets became volatile. The figure of 5 tn $ is to be seen as a rough average. See the current amounts in the ECB's monthly review and the Federal Reserve's Statistical Release, H6.

21 For a preliminary estimate of the sum involved, it is assumed that the balance sheets of other central banks are structurally similar to those of the ECB and the Federal Reserve.

credit creation, and thereby reduce the money supply, because of the endogeneity of the money supply.[22] The Bank of England has recently identified this as the correct description of monetary policy practice.[23]

The effect of the endogeneity of the money supply is especially important when Central Banks buy more SGCBs (for a short period of time as start up financing) than needed for actual money creation. This process contributes to the money creation and the resultant money supply reduction offsetting each other, so that the money supply grows as much as the economy requires expanding to full potential.

When a Central Bank puts a perpetual SGCB on its books to use as collateral for money creation, it meets the classical requirement of James Tobin[24] and Richard Musgrave[25], that government bonds should be the bedrock of Central Bank assets. As the Standardised Green Climate Bonds are issued by a supranational public institution, they have a comparable function to national government bonds. The purchase of Standardised Green Climate Bonds could thus not only be integrated into the currently practised monetary policy measures of Central Banks, but also into classical financial theory.

It would also be sensible to have an agreement between Central Banks taking part in the system to recognise Standardised Green Climate Bonds as tender between them. In that way, exchange rate fluctuations could be reduced whenever demand for specific currencies and corresponding buying Central Banks do not coincide.

Differentiation between Standardised Green Climate Bonds and ordinary bonds

An ordinary bank or an institutional investor who buys a bond wants to earn interest and be repaid the capital in full at maturity. The business model using ordinary bonds can work in a market economy only if the issuer of bonds can generate that interest and the repayments due in the real economy. Because Standardised Green Climate Bonds are not actually repaid and do not yield interest, the only feasible buyers are Central Banks. Due to their right to issue legal tender (in their own currency), Central Banks cannot become insolvent and remain capable of acting even if they have negative equity.[26] When a Central Bank purchases bonds, it does not do that to earn interest[27], but to provide the seller of the bond with money and thus boost liquidity in the economy. Thereby, the Central Bank fulfils the function as issuer of legal tender. A Central Bank does not rely on interest payments nor on the bond being repaid at a certain date. It can absorb bonds with unlimited terms into its balance sheet. As long as it keeps enough stocks and bonds with short terms and/or those it can sell on the market, it can again reduce the newly created money at any time. From a monetary policy perspective, the Central Bank remains fully capable of acting.

22 cf. World Future Council (2016): The meaning of the endogeneity of money for 'conventional QE' and the different kinds of 'helicopter money', Future Finance – Discussion Paper 11/2016.

23 cf. Bank of England: "Money creation in the modern Economy", in: Quarterly Bulletin, Vol. 54, No. 1, 2014, Q1. http://www.bankofengland.co.uk/publications/Documents/quarterlybulletin/2014/qb14q102.pdf ; The bulk of the theory on endogenous money supply was generated from the mid 1980's. Important contributions came from P. Howells and Thomas Palley. See also Moore, Basil J.: Horizontalists and Verticalists: The macroeconomics of credit money, Cambridge, 1988; Howells, Peter: The demand for endogenous money, in: Journal of Post-Keynesian Economics Vol. 18, No. 1, 1995, p. 89-196; Palley, Thomas: Post Keynesian Economics: debt distribution and the macroeconomy, 1996

24 cf. Tobin, James: An essay on principles of debt management, Fiscal and debt management policies; quoted from the German edition. Baden-Baden, 1978, p. 121.

25 cf. Musgrave, Richard Abel: Theory of Public Finance; quoted from the German edition. Theorie der öffentlichen Schuld, in: Handbuch der Finanzwissenschaft, Dritter Band, Tübingen, 1958. p. 136

26 Jordan, Thomas; Braucht die Schweizerische Nationalbank Eigenkapital; Rede vor der: Statistisch Volkswirtschaftliche Gesellschaft, Basel , 28. September 2011 http://www.snb.ch/de/mmr/speeches/id/ref_20110928_tjn/source/ref_20110928_tjn.de.pdf

27 When a central bank buys bonds from ordinary banks in order to inject liquidity, it naturally earns respective interest. That is also a large part of the contribution of profitably for central banks. It is, however, not the proper job of a central bank.

SUMMARY

By deploying 100% renewable energy, Tanzania can provide universal access to reliable energy for all its citizens, while increasing living standards to the level of industrialised countries by 2050. In fact, it is a realistic pathway for the East African country to align with the Paris Agreement and Sustainable Development Goals. Meanwhile, generating the necessary electricity from renewable sources is 1/3 cheaper than from fossil resources. However, this is only the case in the long-term. Significant upfront capital is necessary to ensure affordable energy for all Tanzanians. This paper has outlined how to unlock this necessary investment to implement 100% RE for all by 2050. With the support of Central Banks, the necessary guarantees to lower risks of RE investments as well as mobilizing the necessary scale of investment is feasible. By becoming the first country to test this mechanism, Tanzania can not only harvest the first mover advantage, but also pioneer implementation of the Paris Agreement and Agenda 2030, particularity SDG 7.

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The World Future Council (WFC) works to pass on a healthy planet and just societies to our children and grandchildren. To achieve this, we focus on identifying and spreading effective, future-just policy solutions and promote their implementation worldwide. The Council consists of 50 eminent global change-makers from governments, parliaments, civil societies, academia, the arts and the business world. They identify urgent themes and determine the agenda for our work.
Our headquarters are based in Hamburg, with other staff members operating from London, Geneva, Windhoek and Beijing. With our Council members, we are represented on all five continents. In close collaboration with international organisations, experts, and parliamentarian networks, we identify sustainable and future-just laws and measures worldwide. We communicate directly to policy makers, and the results of our work feed into our educational work, supporting decision makers in implementing good policies.

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