DeKo

An electricity-backed currency proposal

ABSTRACT

Currencies play an important role in facilitating trade and economic growth. Shifts in currency values may lead to economic dislocations deleterious to trade and growth. Most currencies are issued by government central banks. These central banks hold assets in the form of government debt and gold against the currency they issue.

Alternatives to traditional debt and gold assets may make sense for central banks to hold as a supplement or substitute. One alternative asset for a central bank to hold consists of electricity delivering assets. Electricity delivering assets don't need to be physical assets such as fuel or power plants, but rather may be claims in the form of standardized Power Purchase Agreements for the delivery of electricity from power producers.

Electricity delivering assets can hold their economic value more effectively than gold or debt due to price stability and resistance to devaluation from over-issuance. The DeKo-backed currency concept advocates a portfolio of diversified electricity delivering assets that offers more social benefits than gold and retains monetary value better than government debt.

Authors: Nick Gogerty and Joseph Zitoli

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Contact:
ngogerty@thoughtfulcapital.com
jzitoli@thoughtfulcapital.com

1 - Currency Overview

Economies are defined by their primary value-added activities. Their currencies' strength reflects the output of these activities such as agriculture, industry, and trade. The goal of a currency system is economic stability and growth as a means of improving citizens' lives. The first role of a currency for users is as a store of value. After that role is established, a currency's economic utility function is as a means of exchange to foster growth.

Premise/Promise

Currencies are supported by belief systems. An inherent belief for users of a currency is that the currency issuer will not over-issue or debase the currency relative to the asset portfolio held against the currency by the issuer. This condition leads to a reflexive relationship between assets held in a portfolio and the metric used to determine their future value.

A currency requires value stability to perform its first economic role as a store of value to underpin issuance and its second role as a unit of exchange to facilitate trade. Historically, currencies have represented claims on physical assets such as gold, silver or commodities such as grain. The issuance and volumes of these commodity-backed currencies could be separate and distinct from a government's fiscal policy.

Most currencies today represent claims on portfolios of government debt. Debt-backed currencies often hold domestic assets denominated in the currency itself. The bulk of these debt assets are domestic government debt, meaning that a government's fiscal policy (taxation and spending) and monetary policy (currency issuance and inflation targeting) become interrelated.

The interrelatedness of currency issuance and fiscal policy in today's economies entails long term exposure to currency over-issuance, inflation and as a result currency weakness. The value of a currency as a unit of exchange is driven by faith in the currency as a representation of value held by everyone that uses the currency. Currency faith is driven by faith in the issuer and the perceived value of the issuer's underlying asset portfolio. If the assets in the currency issuer's portfolio come to be perceived to be weak in value, the currency may become volatile, and economic contractions may follow.

The DeKo thesis is that electrical energy in the unit form of delivered kilowatt hours - a DeKo - can be a more stable asset for backing a currency than gold or debt. A DeKo-backed currency can offer a combination of stable value together with economic utility that neither debt-backed nor gold-backed currencies offer.

Citizens

Citizens holding a currency bear the ultimate risk for its usefulness as a store of value and unit of exchange. The more stable the currency, the longer the period citizens may hold or "bear" the currency, using it for trade or as a store of value. This faith in a currency's purchasing power and unit of account allows for longer-term planning and investment.

Monetary Policy

Many countries consider currency devaluation as an escape mechanism for economic relief during fiscal budget or debt crises. These crises place the ability for a government to service its debt at risk. The economic pain of devaluation (inflation spikes), acting as a penalty on savers, coupled with lingering currency uncertainty, hinders the private sector capital appetite for longer term and larger capital planning and investment. This diminished investment appetite reduces a country's longer term potential rate of growth.

Debt-backed currencies do facilitate trade and investment as a means of exchange. However, the reflexive relationship of a government debt-based currency poses analytical and political challenges because it is valued and priced in terms of itself. A gold-backed currency provides a measure of the economic value of the future currency issuance. This measure of future utility may provide earlier and clearer price signals for economic and political actors in government debt market pricing and demand. However, the limitation is that gold acts as a store of value as compared to debt which acts as a means of exchange. Debt and gold mirror each other in their respective strength and weakness.

A Government and its Central Bank Relationship

Depending on the country, the central bank has varying degrees of freedom with respect to the assets it may purchase and how it manages its monetary policy. The relationship between a country's government and central bank runs a continuum from total central bank economic independence to a fully captive and controlled central bank. Economic independence considers the extent to which the central bank is free from government influence in implementing monetary policy.

When a central bank or currency issuer is in a fully captive role, the currency issuer typically becomes the largest owner of domestic government debt. This situation leads to a distorted market for government debt: a politicized central bank effectively treats currency holders as captive consumers of government debt. Many have argued that the forced consumption of government debt by a central bank and de facto currency holders is a silent tax in the form of inflation. This condition can occur whether those assets are gold, debt, or some other form or representation of an asset.

Useful price signals for government debt markets may be hidden due to the currency holders' role as captive debt consumers. A variant of this situation occurred in Japan

recently as its large postal savings bank became a quasi-captive consumer of government debt, effectively using domestic savers in the postal banking system as captive government debt consumers, allowing the government of Japan to have a 200% debt to GDP ratio with minimal interest rates. This indirect tax on currency holders and savers may hinder or mask fiscal policy reform needs.

Gold-Backed Currency

Gold-backed currencies rely on the assumption that the gold is available relative to the redemption demand for the currency. At various times, banks issuing gold-backed certificates and notes have been found to not have enough metal on hand due to over-issuance and a crisis in confidence. This type of issuer liquidity and/or solvency risk is inherent in any currency where the issuer isn't fully transparent with regard to the nature and availability (term structure) of its asset holdings, and where the asset base is too leveraged relative to issuance.

Gold-Backed Currency Challenges

Hard currencies backed by gold or other commodities have their own challenges relative to risk, storage, pricing variance, reserve ratios, and market distortions. Since 1972 and free floating gold prices in the US, the average annual range of price fluctuation in dollars for the price of gold has been 37%.[1] One can argue whether this fluctuation reflects mostly perceived variance in the demand for currency or for gold. Regardless, such variance poses challenges to the "stable" unit of value argument for gold. What many pro-gold currency backers actually seek is an issuing entity with policy stability and full transparency. These features are sought as mechanisms for increased value stability in the underlying assets.

It can be argued that increasing gold production due to central bank demand provides less social utility and developmental progress than increasing demand in electricity production. Gold has limited utilitarian uses relative to the amounts produced. An estimated 11% of annual gold production is for industrial use[2].

> *One might say that gold is dug out of dangerous holes in poor countries to be re-buried in safe holes in rich countries. Gold's primary value is in the belief that others value it. Gold is a socially constructed store of wealth, subject to the fears and beliefs of others, but not their actions or material needs.*

Debt-Backed Currency

Domestic government and private sector debts, in the form of notes and bonds, are claims on future cash flows mostly priced in the domestic currency itself. If the currency

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[1] http://www.onlygold.com/tutorialpages/PicesSince1972FS.htm (See Appendix)

[2] http://www.gold.org/investment/why_how_and_where/why_invest/demand_and_supply/

or economy weakens, the value of those claims may also weaken at the same time. One may consider the currency's underlying debt assets as more uncertain in future value, due to the reflexive relationship of an asset being valued and priced in terms of itself.

Debt-Backed Currency Challenges

Governments seeking ways out of fiscal or economic crisis may direct a captive central bank to create currency via purchases of government debt, mortgage-backed securities or other securities. These central bank purchase activities increase the narrow money supply and may induce significant inflationary scenarios. In captive central bank currency environments, currency issuance, economic growth and fiscal policy are reflexively interrelated, which may lead to extreme feedback loops and convex (exponential) currency price outcomes. This conflation of central bank monetary and government fiscal policy may introduce significant uncertainty into the currency valuation equation: significant value uncertainty is associated with assets priced at risk discounts and on a large scale may impact economic growth and citizen well being.

Domestic Debt Ring of Uncertainty

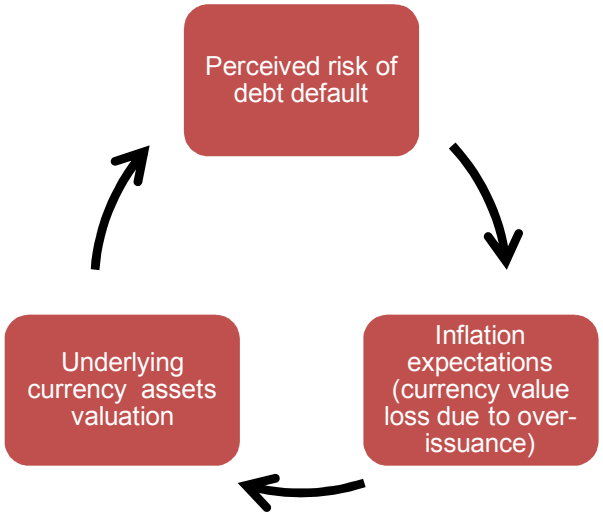


Chart 1

These feedback loops (Chart 1) may lead to convex (exponential) changes in price (current purchasing power) or yield (expected value going forward). Like many convex relationships, the drivers are often misunderstood or misidentified until it is too late. Going from a 20-50% debt to GDP ratio is not equivalent to going from 70%-100% debt to GDP ratio. At a certain point of interest payments outstanding relative to GDP, the payments become so large that they dominate budgets, with governments effectively entering a debt spiral.

Currency prices are supported by the perception of the relationship between underlying assets and the issued currency. Most central banks hold a mix of gold and government debt-based assets in their portfolio against the liabilities of issued currency. Gold has a negative effective yield and fluctuates in value relative to perceived scarcity. Government debt is vulnerable to over-issuance and to currency devaluation. DeKos, in the form of electricity deliverable assets, can serve as a complementary asset for central banks that supports both value stability of a currency and economic growth.

2 - DeKo Definition

A DeKo represents kilowatt hours delivered, a unit of work or energy. The terms and nature of delivery are standardized and the assets held by the issuer represent the ability and expectation to deliver DeKos as contractually backed. DeKo-based assets are valued at a premium or discount relative to the standard delivery attributes, which include physical location, rate and time of electrical delivery.

The DeKo-based currency issuer holds a portfolio of electricity delivering assets. These assets may be claims in the form of standardized Power Purchase Agreements (PPAs) for the delivery of electricity from power producers. A PPA is a contract between two parties, one that generates electricity for the purpose of sale (the seller) and one that purchases electricity (the buyer).

Coal, oil, natural gas, hydro, geothermal, solar, wind, etc. are not directly DeKo deliverables. Electrical output measured in kilowatt hours (kW•hs) (work unit) made available on the grid or to an agreed off-taking party is the DeKo-based asset deliverable. The DeKo represents a promise of the standardized delivery of work, not any particular fuel. Fuel is potential energy. The cheapest to deliver electricity (based on fuel or generating facility) is chosen by the deliverer and the cost of shipping electricity transmission is adjusted based on agreed rates and specifications of cost/loss to meet the contractual delivery requirements.

An economic risk is that the market represented by the asset backing a currency may become economically distorted by the central bank's purchases. Ideally, the central bank should manage currency stability in Purchasing Power Parity (PPP) terms. An economic promise for electrical energy delivered using DeKos as the underlying asset provides a standard future reference of the functional value in PPP represented by a currency. This standardized reference serves to anchor one side of the value equation versus the reflexive nature of domestic debt value discussed above.

Each issued DeKo represents a share of a portfolio of electrical energy assets approximating the delivery of 10 kW•hs. It is important to make the distinction that each DeKo only approximates 10 kW•hs, as future delivery contracts are adjusted relative to delivery risk factors. The central bank's mandate should be to maintain a portfolio equivalence ratio of 10 kW•hs delivered, with minimal failure to deliver risk relative to each DeKo-backed note or coin issued physically or electronically. A conservative central bank would be likely to purchase excess forward delivery contracts relative to outstanding issuance to reflect failure to deliver risk.

DeKos vs. Gold and Debt-Backed Currencies

The DeKo can provide a more stable unit of value over time than gold or debt with greater socioeconomic benefit. Most people calling for alternatives to debt-backed currencies discuss gold-backed currencies. Gold is easily managed, measured and has historically been perceived as a store of value. Although limited in utilitarian value, the historical logic that gold has value across cultures has made it a store of value, a reflexive form of belief and associated behaviors. Gold is primarily a volatile scarcity-based asset contributing only marginally to social progress. Many who favor gold-backed currencies are articulating a desire for a stable independent central bank issued currency with a fixed reserve ratio. In this guise, gold is the fiscal and physical expression of a rational economic desire for price and monetary stability.

The value of the deliverable assets representing DeKos can be more stable than highly concentrated domestic debt assets, which may be devalued due to inflation (over-issuance). DeKo asset risk is based on electrical energy delivery, not on monetary or fiscal policy. The DeKo issuer could maintain callable assets to meet the capacity for delivery of outstanding DeKos.

The assumption is that the utilitarian value of electricity can be a more stable store of value for a currency on a forward basis than gold or debt alone. DeKos offer more utilitarian advantages versus debt-backed currencies, since they are less subject to political spending whims. A kilowatt hour today has the same approximate functional utilitarian value as a kilowatt hour tomorrow. The same can't be said for government bond interest payments that vary in value relative to fiscal and economic circumstances on a forward basis.

The DeKo and Commodity-Backed Currencies

Commodity-backed currencies represent the extreme of a continuum in terms of a fixed value callable asset. The DeKo posits that interesting choices lie between debt (low certainty of asset claim/deliverable but high economic utility) and gold (high certainty of asset claim/deliverable but low economic utility) backed currencies. This relationship is indicated in Chart 2 below.

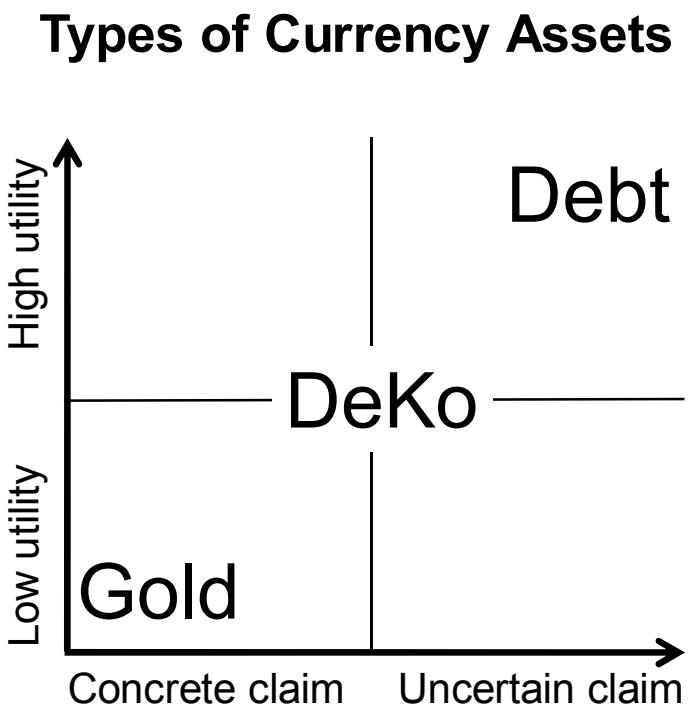
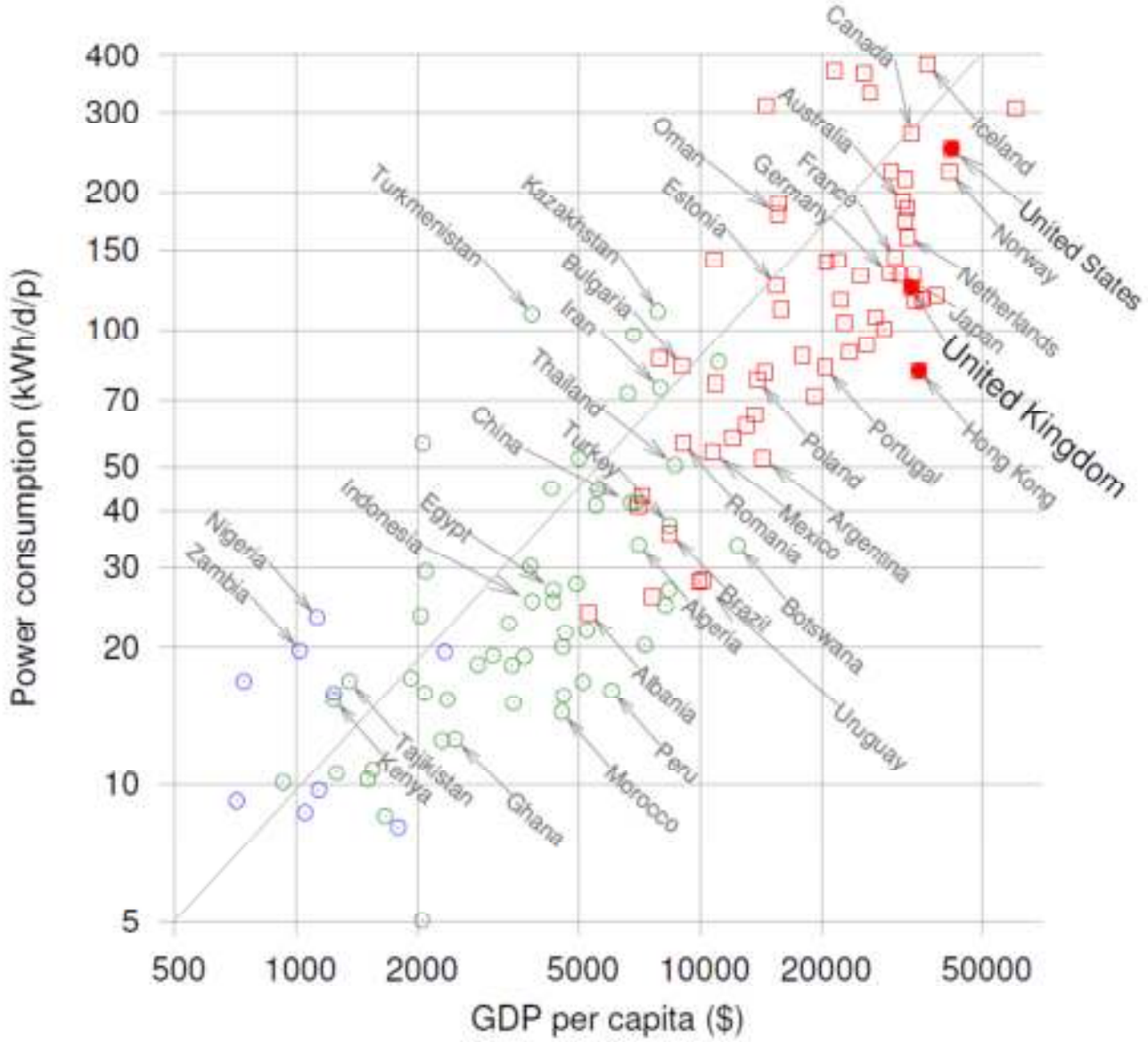


Chart 2

A problem with gold and commodity-based currencies is the negative real yields over time due to the associated storage and insurance costs. Real electricity prices are moderately stable over the long run with demand growth tracking GDP closely in most countries over the decades.

Historically, many gold-backed currencies have over-issued in fractional reserve systems relative to the outstanding calls on gold. This over-issuance leads to liquidity crises when the gold is called upon by currency holders. The Panic of 1907 (prior to the 1913 establishment of The Federal Reserve in the U.S.) was exacerbated by gold being shipped to San Francisco after the 1906 Earthquake and the fear of a gold shortage relative to note issuance at various East Coast currency issuing banks.

Power Consumption per Capita vs. GDP per Capita (USD)



Source: David J.C. MacKay. Sustainable Energy – without the hot air, UIT Cambridge, 2008.

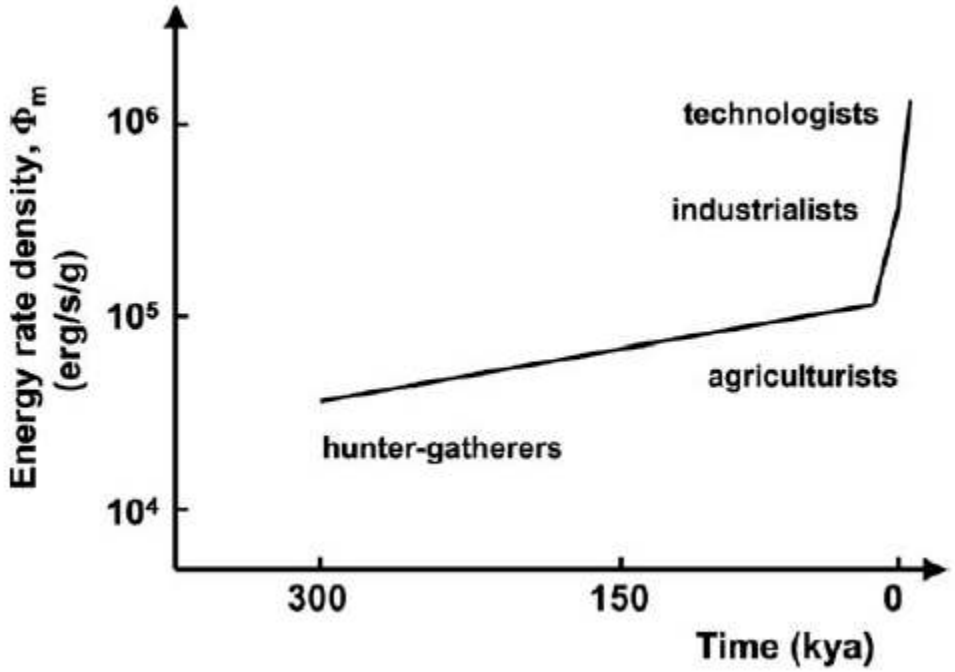
Chart 3

Electricity has a standardized value and a range of utilitarian purposes. The interconnected networks of electric grids have the benefit of being transparent, redundant, and adaptive to crisis. Chart 3 shows the 2007 power consumptions of countries versus their gross domestic products (GDPs). Squares show countries having a "high" Human Development Index (HDI) score, circles, "medium" or "low" HDI score.

Arguably, readily available affordable electricity is a crucial part of the social and economic development of emerging economies. The opportunity exists for central bank holdings of emerging economies to support domestic electricity production and

distribution. An emerging economy central bank investing in electricity delivery assets may prove more socially beneficial for the country's citizens than purchasing the debt of developed nations or purchasing gold which would simply sit in the central bank's vaults.

Energy Rate Density in Human Societies



Source: Chaisson, E. J. (2011), Energy rate density as a complexity metric and evolutionary driver. Complexity, 16: 27–40. doi: 10.1002/cplx.20323

Chart 4

Chart 4 illustrates the advanced use of energy in the evolution of human societies. Electricity is already measured in work units (kW·hs) which most of our modern day technology is reliant upon to function. This aspect is an important reason to choose electricity over other commodities such as metals or grains to back a currency.

3 - Rationale for DeKo Use

One interesting option for countries dependent on imported fuel resources for electricity generation is to secure foreign delivery and supply terms using the DeKo with other countries, using agreed upon grid delivery points and foreign electricity generating firms. These DeKos would essentially be central bank assets. These delivery facilities, similar to liquidity guarantees at banks, could be established at issuance and called upon at the appropriate times. By separating the electricity delivery point from domestic currency issuance, debt and political risks could be mitigated. The central bank or issuing body would hold a portfolio of delivery guarantees and international electricity swaps on its books as assets/liabilities.

Should the issuing country experience an economic crisis, these foreign delivery assets should retain their value in the same way that higher rated foreign government debt does for some developing countries. This foreign electricity delivery asset portfolio for a currency issuer is not as radical as it sounds. The currency strength of many countries is assessed relative to each country's central bank's foreign currency and debt holdings relative to its outstanding balance of payments and issued currency.

For countries with fuel import risk, another DeKo option exists, namely renewable energy issuance, which may be valued at a premium due to lower long term delivery risk. Most non-carbon electricity generating facilities are capital intensive at launch with small ongoing operation and maintenance costs over their 15-30 year operational lives. Proven non-carbon energy sources include nuclear, hydroelectric dams, geothermal, wind and solar. These non-carbon energy sources contributed 30.6% of all electricity generated in the U.S. in 2009.[3]

Electricity generation that uses hydropower, geothermal, solar, nuclear and wind require limited or no hydrocarbon fuel. Large upfront capital combined with marginal operation and maintenance costs represent a different cost and risk structure relative to hydrocarbon-based electricity generation. Fuel risk is mostly eliminated in renewable energy situations. The intermittent nature of some renewables is less of an issue when delivery obligations are considered over longer periods and in the context of large geographic grids with baseload equivalent sources available. Renewables-backed DeKos may trade at a premium due to the mitigated fuel risk going forward.

A country wishing to minimize the dependency risks of imported or single fuel feedstock could accelerate renewable energy infrastructure projects by taxing local fuel-based electricity production and subsidizing other solutions, while also purchasing DeKos.

[3] http://www.eia.doe.gov/cneaf/electricity/epm/table1_1.html

During fiscal or energy crises such policies and the related investments in diversified generating assets or enhanced transmission capacities for efficient electricity delivery may act as a mild stimulant to the economy. Most renewables, such as concentrated solar and wind are costly during their early stages of technological development. These technologies benefit from larger stable sources of capital and accelerated development, leading to lower deployment costs going forward.

Good candidates for DeKo adoption would be the countries that have reliable renewable electricity generating assets. There are currently over fifty countries where the percentage of electricity production from renewable sources is greater than 50%[4]. Most notable are Paraguay and Iceland where renewable electricity production is at 100%.

Furthermore, accelerated investment in technology-driven energy resources drives the experience curves faster in renewable technologies. Research from the International Energy Agency (National Renewable Energy Labs) indicates a 10-20% decline in cost per watt delivered for every doubling in production of renewable generation assets due to experience curve effects[5]. Accelerated innovation due to increased deployments likely reduces future renewable energy costs, providing benefits for citizens in the form of cheaper and cleaner energy and potential export trade opportunities for firms that have developed innovative technologies. Depending on the structure of delivery terms, DeKo issuance could be used to spur "smart grid" transmission improvements, helping to scale other renewable projects and increasing electrical grid efficiency.

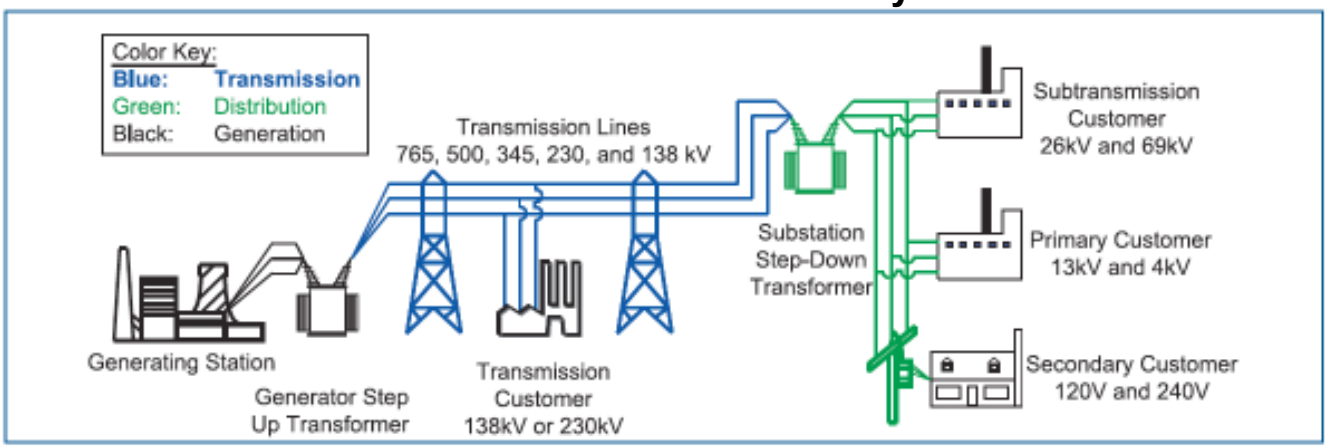
One risk is that DeKo issuance may distort electricity markets with overly cheap energy, leading to waste. A potential response to such risk is to have the central bank limit delivery obligations to a portion of grid capacity or demand at a given time. An analogous behavior in debt-backed currencies is the restriction of some central banks limiting the percentage of domestic debt purchased at auction.

[4] http://www.eia.gov/cfapps/ipdbproject/IEDIndex3.cfm?tid=2&pid=2&aid=12 (See Appendix)
[5] http://www.iea.org/textbase/nppdf/free/2000/curve2000.pdf

Physical Functionality

The electricity industry has three primary functions: Generation, Transmission, and Distribution (See Picture 1). Generation occurs at power plants (natural gas, coal, nuclear), hydroelectric dams, wind farms and other industrial scale electricity generating facilities. Transmission occurs using large towers and high voltage cables over long distances sometimes hundreds or thousands of miles. Distribution involves stepping down voltage at local substations and distributing electricity to homes and offices.

Basic Structure of the Electric System



Source: http://www.ferc.gov/industries/electric/indus-act/reliability/blackout/ch1-3.pdf

Picture 1

The DeKo assets are purchased outputs from generating facilities that are then sold to transmission firms, wholesale distributors and industrial electricity users. Transmission and distribution utilities face supply mandates and requirements for uptime that require a low tolerance for risk. Independent regulation of operators is needed to maintain grid uptimes and to avoid the monopoly inherent in the network economics of electricity transmission and distribution systems. If a country was found to not have a robust electricity market, then electricity delivery assets could be purchased in other secure countries. The assumption being that these countries' PPP for electricity is stable relative to the DeKo.

The DeKo issuing central bank purchases output from a mix of generating facilities. As such, the firms that own generating facilities must have excellent finances or sell power at a discount relative to perceived risk of failure to deliver. DeKo assets are equivalent to super-senior or first calls on delivered output power.

Many central banks that purchase other countries' assets to back a currency hold a large portion of developed countries' government debt. These assets are often viewed as more stable in value terms than domestic debt. The regulatory and monopolistic nature of electricity markets requires serious consideration relative to delivery terms and the

impacts of a larger player, such as a central bank's potential dominance of electricity generation.

One may question the nature of a non-storable asset such as electricity. DeKo assets representing electricity delivered aren't viewed as tangible as claims on gold or a commodity resting in a vault. The response to this question is two-fold. First, Power Purchasing Agreements, debt of firms that own generating facilities, and other financial obligations relating to the power industry, are all based on the delivery and value of non-storable electricity. Second, electricity as a cheaply distributed form of energy across a whole economy has direct and continuous utilitarian value as driver of growth; whereas gold is bounded by its status as a store of value and contributes to economic growth only indirectly through its support of a currency.

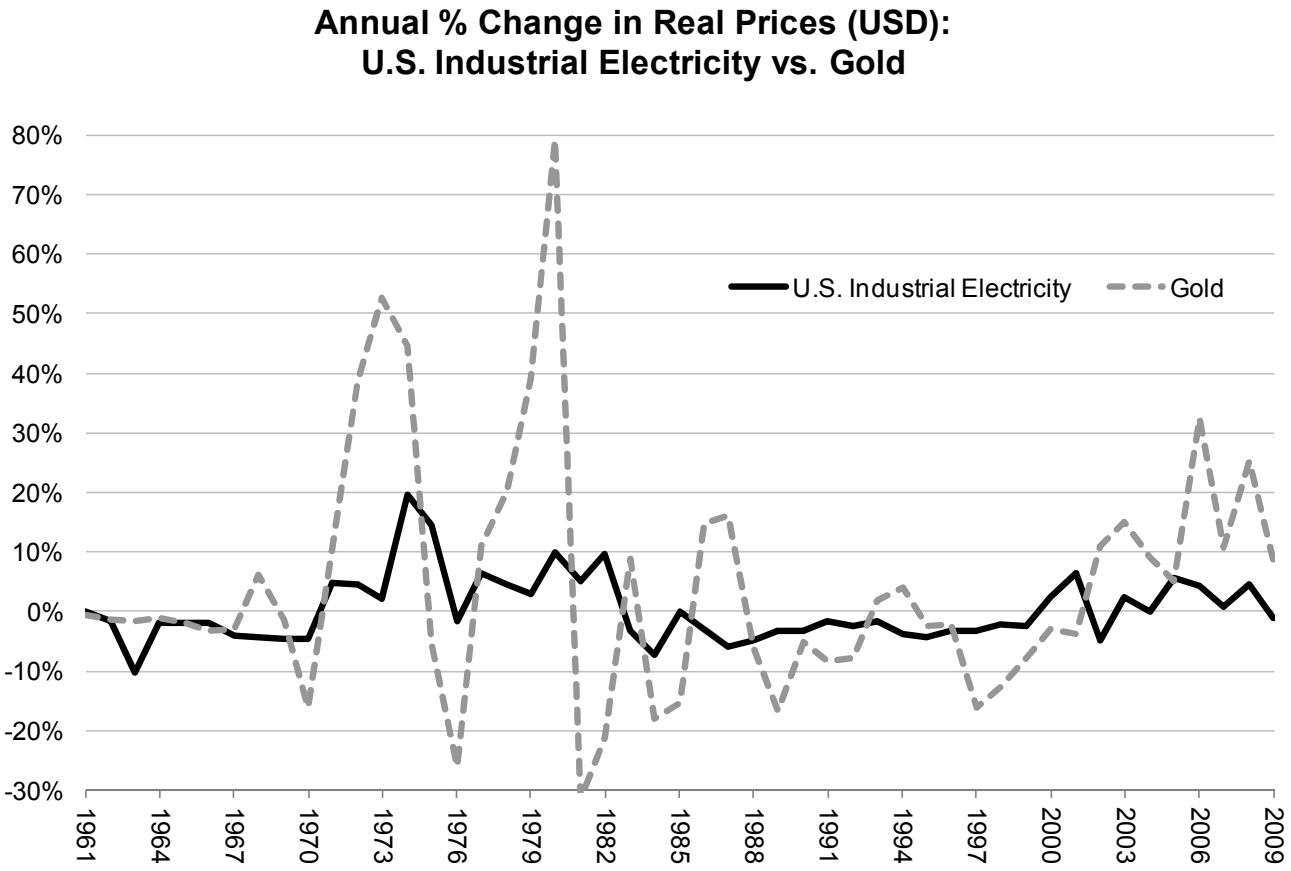
4 - DeKo Implementation

A type of DeKo asset exists in the form of Power Purchasing Agreements (PPAs). Before building a new coal or natural gas power plant, a generating firm typically signs a PPA deal with a utility company that acts as the transmitter and distributor of electricity. The utility agrees to buy the electricity produced by the generating firm in exchange for an agreed price. PPA contracts typically represent 10-20 year agreements between power generators and utility firms for the exchange of electricity at agreed rates and terms.

The utilities and industrial companies that agree to take electricity from power generating firms are known as off-takers. Off-takers agree via PPA contracts to take an amount of electricity at a given price for a given period of time. After securing PPA terms and price guarantees with a utility, the power generator often uses the PPA off-taker terms and prices to secure project finance to build the electricity generation facility and lock in the purchase and delivery of fuel with long term contracts. The expected operating life of the physical generating facility and fuel agreements are similar to the duration of the original PPA to minimize fuel or operating mismatch risk for the power generator and project financiers.

PPAs function as large chunky non-standardized DeKos, analogous to a collection of bills with denominations of $100 million or $500 million equivalents. These bills or contracts are representations of value, but are not efficient for retail or consumer trade. Other forms of DeKo type assets are electricity swaps and contracts for the guarantee of electricity delivery.

The U.S., like many countries, has an open electricity market with standards for delivery and settlement in place. For the DeKo, an open market determines the value of future deliveries similar to the way open government bond auctions function today. DeKo assets trade at premiums or discounts relative to the perceived future electricity delivery risk associated with the asset. This premium or risk asset price variation is similar to a 10 or 30 year government bond purchased at a premium or discount in the market based on supply, demand and risk perceptions of the bond issuer delivering the annual interest payments and principal.



Source: U.S. Energy Administration and World Gold Council

Chart 5

Chart 5 compares the annual percentage change in real (CPI adjusted) average prices of U.S. Industrial Electricity to gold. Arguably, the greater price stability makes delivered electricity a more stable store of value than gold; and in addition, electricity delivers a functional utilitarian market price that drives directly economic activity.

The goal of a DeKo-backed currency is long term stability in the asset base, so that the issued currency acts both as a store of value and as utility value. A store of value from a citizen's perspective is best measured in purchasing power. Purchasing power is the number of goods/services that can be purchased with a unit of currency. Another way of measuring value is utility value, which in economics is a measure of relative satisfaction.

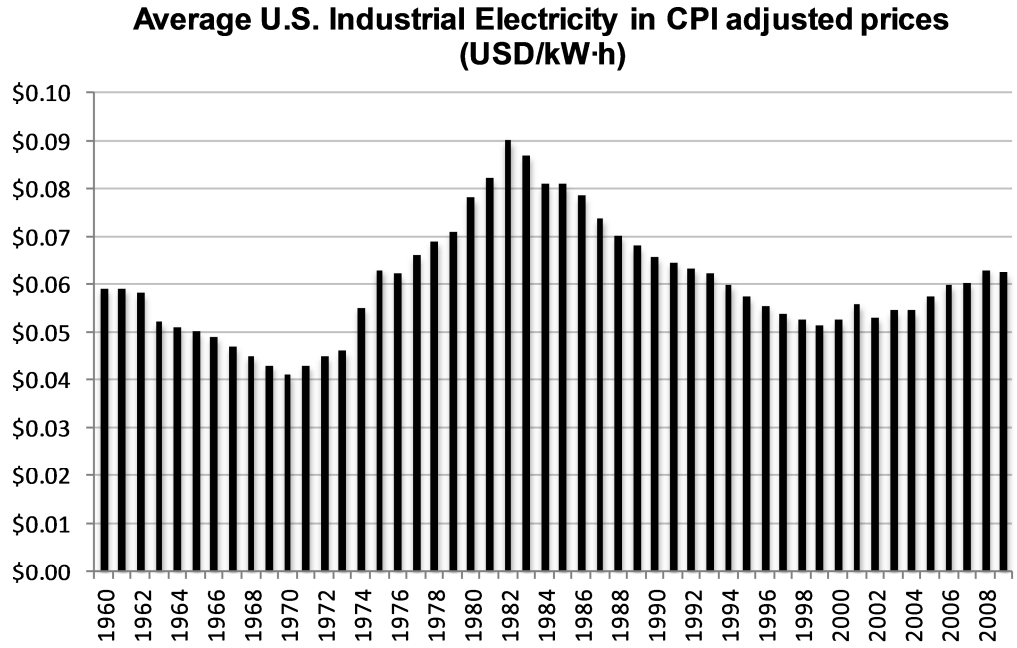
The DeKo-backed currency forward asset value has two components: 1) the cost of producing delivered kilowatt hours relative to substitute offers and 2) the utility value of the delivered kilowatt hours. The dynamics of changes in electricity cost are driven by technology improvements, innovations and fuel costs. The future utility value of kilowatt

hours delivered is a function of competing electrical suppliers and innovations related to consumption value.

Electricity prices vary broadly depending on location, time of day, and other peak demand related issues. These price fluctuations and variances are related to short term localized geographic spikes. Localized electricity price variances are dealt with by contracts using standardized terms for delivery and settlement over longer periods, similar to how PPAs function today.

The historical price of electricity in real dollars has been fairly stable; while the social utility has improved as electricity based innovations provide added value for consumers. The yield or output of a debt-backed currency is more currency. In debt-backed currency regimes, the purchasing power of the currency tends to decline over time due to inflation. Inflation means the assets backing a debt-based currency have annual interest payments and future principal repayments with a declining utility value.

From a monetary policy standpoint in the U.S., inflation adjusted electricity prices peaked at the same time that a strong interest rate policy was being used to shrink inflation during the Volker period at the Federal Reserve. The cost increases in real electricity rates would have acted as a signal, if not an actual curb, on money issuance of a DeKo-backed currency during the late 1970's and early 1980's (See Chart 6).



Source: U.S. Energy Administration DOE

Chart 6

Cheapest to Deliver

In the bond market, the concept of cheapest to deliver indicates delivery of the cheapest asset available to fulfill the specifications of an obligation. The same holds true for electricity. Utility companies seek a mix of the cheapest stable portfolio of electricity sources over the long term relative to price and technology risks, taking a diversified portfolio approach to their generating asset mix.

The closest financial debt instrument to a DeKo is a "strip bond" (a series of bond coupons stripped from the underlying bond), paying out continuously. In the DeKo instance, the coupons are redeemed continuously or at some agreed rate and delivered as kW•hs instead of more DeKos.

DeKo delivery terms likely involve longer term contracts spanning years determined by issuer and redeemer. The terms are normalized relative to grid capacity, point and rate of electrical delivery. 10 gW•hs delivered over ten years near a metropolitan area with limited transmission and distribution costs and a known stable fuel supply may be worth more than 10 gW•hs delivered over one year to a remote area using a price volatile fuel.

Electricity delivery standards in the U.S. use performance definitions found in electricity futures and forwards contracts. Delivery terms and remedies for out of contract terms for physical delivery are articulated in contract settlement terms. DeKo asset delivery terms can be standardized similar to futures contracts.

DeKos are first issued against cheapest to deliver generating assets as points of delivery. The generating asset owners sell guarantees for issuance against DeKos. DeKos trade at risk spreads similar to corporate or other bonds, meaning their prices vary relative to perceived delivery risk.

The U.S. electricity market is large enough to act as the asset backing the issued money base. Approximately 3.59 trillion kW·hs were produced and consumed in the U.S. in 2009[6]. This amount equated to USD $363 Billion in value, annually[7]. When including forward production curves, fuel swaps, etc. the electricity market appears deep enough to function as an asset pool for basing a currency. For example, as of 2010, the U.S. Federal Reserve had a historically enlarged balance sheet of roughly $3.0 trillion in assets, which included $1.0 trillion in mortgage-backed securities.[8] The typical Fed balance sheet is closer to $1-1.5 trillion in assets. For those who consider currency to be strictly currency

[6] http://www.eia.doe.gov/cneaf/electricity/esr/esr_sum.html
[7] Ibid
[8] http://www.federalreserve.gov/monetarypolicy/bst_fedsbalancesheet.htm

in circulation, the figure is $829 billion according to the NY Fed in Dec. 2010, with the majority residing outside the U.S.

Therefore, it is believed that the electricity markets in many countries are large enough to meet the two critical requirements to serve as the asset base for a central bank:
1. The electricity market is independently regulated and open to competition while being large enough that normal central bank purchasing of PPAs and other deliverable electricity forwards will not significantly alter or distort the free market pricing mechanism.
2. The portfolio of underlying generating assets is diversified enough in fuel type and geography to limit portfolio concentration risk in the event of natural or other disasters. For example, a single giant hydro electric dam in a small country may represent too much risk concentration for a country's economy as the loss of the asset could coincide with a currency decline associated with a failure to deliver in the central bank portfolio.

DeKo Adoption Path

Creating DeKo-backed currencies is straightforward. Central banks start by purchasing and holding DeKo compliant securities meeting DeKo delivery standards. No changes need to happen to physically issued currency. A token purchase of $100 million or $1 billion of high grade electricity deliverables by a central bank starts the process.

Central banks follow the practice of purchasing domestic debt or AAA rated foreign government debt until a significant crisis alters beliefs and then behaviors. The argument for central banks to hold government securities is usually that these assets are perceived to represent the lowest risk. Central banks may find this argument flawed in the coming years as many governments face serious fiscal challenges.

Some questions have been asked, such as: "What if the electricity grid goes down?" This event occurs in spot events for a short time, but it has limited impact on the value of debt and delivery of electricity in the long run. The terms for fail to deliver based upon point of failure identify the associated penalties and damages owed to the parties.

Another question often raised is the fact that electricity delivery assets are a form of debt. The answer is that DeKos are a fixed form of debt obligation whose value in PPP terms doesn't change because a kW•h has a stable future utilitarian value. In contrast, domestic sovereign debt often loses forward PPP value due to inflation, deficit risks or default.

The relationship between electricity delivery and GDP growth is so close that economists use growth in electricity consumption as a proxy for GDP (See Chart 3). Extreme increases in demand for electricity relative to supply could indicate an overheating economy. The resultant increase in price of near term delivery electricity would

strengthen a DeKo-based currency acting as potential break on price based inflation. Conversely, recessions and economic contractions are often associated with declines in electricity consumption. Such electrical demand declines would like weaken the DeKo slightly. Depending on the term structure of the DeKo portfolio, the currency could act as a natural countercyclical dampener for the economy. Countercyclical monetary policies can promote stable growth by minimizing both bubbles and troughs in GDP over time.

The risk of an electrical asset default exists in the form of a failure to deliver electricity. The failure is the economic equivalent of bond default in a portfolio of assets. Depending on the size of the default and recovery, the central bank portfolio suffers relative to its exposure. This process works in the same way that bonds defaults do. An argument is made that gold doesn't default, but due to storage and insurance costs, it has a perpetual negative yield.

Consumer DeKo Experience

Current notes and coins issued stay the same for a DeKo-backed currency. Dollars, Euro, Yen, etc., all become DeKo(ized) by the central bank's purchase of electricity delivery assets. Functionally for citizens in the near term, the DeKo looks and works like existing debt-backed currencies. The objective is that over the long term DeKo assets should hold their value with a lower level of volatility than gold or debt. Today's DeKo-based currency should represent the same utility function as a DeKo in the future. As such, the DeKo acts as an effective diversifier of central bank portfolio risk: and in so doing, it stabilizes the value of the currency that consumers use as the medium of exchange.

In most countries, the central bank has a legal monopoly on the issuance of legal tender. Most likely, DeKo-based currencies will be central bank issued. The goal of the DeKo is not the name on the currency or its physical form, but rather asset base value stability combined with economic utility, a combination that neither gold nor debt money deliver. Yen, Yuan, Euros, Dollars or Pesos backed by some or all electricity deliverables could be considered DeKo currencies. The DeKo is a method for securing a more stable value currency via the central bank portfolio using electricity delivery assets. For consumers who trust and are familiar with current debt-backed currencies, the notes and coins stay the same.

The public won't convert its currency directly to kilowatt hours. The DeKo-backed currency isn't kilowatt hours in the pocket the same way that dollars are not directly convertible into a direct claim on a portion of the central bank's assets. A DeKo-backed currency is a representation of value based on electricity delivering assets. This public function and perception of a DeKo currency is similar to a debt-backed currency, but with

greater stability. The DeKo stability benefit needs to be articulated in conjunction with the ability to maintain, if desired, physical current note and coin issuance. An electrical energy-backed currency reflects the monetary promise of physical delivery of electricity, versus debt-backed currencies that are the monetary promise of a monetary promise, and versus gold-backed currencies whose monetary promise of convertibility is subject to prevarication and suspension by central banks under pressure from governments or economic crises.

5 - DeKo Economic Benefits

The DeKo-based currency is predicated upon a central bank maintaining a portfolio of assets approximating 10 kW•hs at some near term duration relative to the issuance outstanding. The value of a currency issued is determined by perceptions of the quality of the asset base representing it. This value is best supported by the full transparency of the portfolio and the balance sheet of a central bank.

Deflationary Scenario

DeKos can act as an economic governing mechanism by dampening swings in GDP. During economic contractions, the cost of issuing DeKos (inflating the money supply) could decline as near term anticipated electricity demands could decline. The issuer could seek to issue cheaper DeKos at this point to increase the money supply or retain the stronger DeKo issuance outstanding.

Inflationary Scenario

Asset based inflation due to uncontrolled credit expansion (broad money supply) presents a challenge to any economy or central bank. DeKos could be redeemed during rapid economic expansion as the utilitarian value of electricity would be considered worth more and called in to meet demand. In such a scenario, the outstanding DeKo supply shrinks, effectively shrinking the narrow money supply, acting in a countercyclical fashion and aiding economic stability.

Currency Crisis Mitigation

During severe crises, countries give up the power of quasi-captive central banks. When a currency becomes too debased and discredited, consumers and industry start using other currencies for transactions. In the 20th century this practice often meant de facto dollarization as locals preferred U.S. dollars as a store of value and medium of exchange.

The current physical delivery demand is met on an electrical grid; whereas the likely period for DeKo delivery demand (DeKos being called in) is during or before a crisis. The DeKo delivery asset promise could be issued or designed with a phased redemption schedule; or assets could be swapped out, similar to open market operations used by central banks with debt.

A DeKo issuer advantage is the countercyclical nature of redemption demand. Currency crises associated with liquidity panic and economic crises often go hand in hand. Economic crises are typically related to periods of low electricity demand. During a crisis, the central bank could purchase electricity deliverables, reducing prices for electricity while expanding the money supply. The reduced electricity prices could act as an economic stimulant at the same time that the money supply is increased.

The rise in real industrial electricity rates would have made DeKo issuance more expensive during the 2001-2007 period when a tightening monetary policy would have been helpful (See Chart 6). In the same period, the cost of DeKo issuance as reflected in prices post 2008 would have lessened, effectively easing monetary issuance.

Emerging Economies and Developing Country Benefits

Many emerging countries have poor physical infrastructure combined with scarce capital for electricity market development. Legal statutes are also weak, in practice if not in principle. In uncertain utility regimes, central bank issuance of DeKos has to be backed up with energy policy reform.

Central banks of emerging economies could issue DeKo-based currencies supported by domestic energy assets. This demand for increased electrical generation and related infrastructure in the country to meet the delivery terms of the assets would likely lower prices. Lower real electricity prices appear to be a worthy goal in light of IMF and World Bank mandates for improved standards of living through economic development and stability.

The currencies of developing nations that would use a DeKo-backed policy would trade at premiums or discounts based on perceived threats of default, energy nationalization or other risks to promised electricity delivery. If the electricity delivery risks are too high, emerging nations could purchase electricity delivery claims in less risky nations.

A central bank's foreign currency and debt holdings can be volatile due to changes in inflation, exchange rates, and government policies. By holding electricity delivery guarantees in a basket of recognized delivery mechanisms, countries may have cheaper, more stable currencies. Active central bank purchases of delivery guarantees may grow the electricity market.

The technical and price impacts of the DeKo need to be assessed to determine deliverable terms and issuer backing. Initially, DeKo delivery terms are created around grid constraints. Most electric markets suffer from under investment in transmission facilities. Traditionally, electricity operators have focused on the reliability of delivery at the expense of innovation, efficiencies and associated cost reductions. Over time, the DeKo market could lead to improved domestic electricity markets due to better investment in transmission facilities.

Convexity Risk and Outcomes via Captive Central Banks

Debt-backed currencies are supported by future taxation promises represented as government bonds priced in the currency itself. These future taxation promises presume a government can service its debt load out of tax receipts and be fiscally prudent while

possessing stable economic growth. Most government debt service promises are subject to statistical assumptions about taxation, spending, and economic growth. As these premises and promises vary over time, a country can find its debt issuance and currency simultaneously challenged at home and abroad. These twin challenges of limited fiscal policy maneuvering room and currency volatility can have severe economic impacts. The DeKo-backed currency may be more stable due to less fiscal policy sensitivity.

Limited Flexibility in Monetary Policy

Advocates of gold-backed currencies need to establish the extent and proportion they seek in fixed or reserve issuance. A fixed issuance involves X amount of currency fixed to represent Y amount of gold stored. Most gold-backed currencies have been of a fractional reserve basis where a fixed amount of gold was held relative to a callable ratio of outstanding bank notes. These fractional reserve currency systems may have $100 worth of issued notes outstanding backed by $20 worth of gold, a 5:1 ratio. This system follows the standard premise and mechanics of fractional reserve banking. In times of crisis or monetary contraction, the desire to increase the broad money supply in a fractional gold system involves acquiring more physical gold, which is difficult on short notice, or increasing the issuance reserve fraction which creates currency weakness.

Debt-backed currencies offer the flexibility of the fractional system with the debt issuer representing the fractional issuance risk. During a liquidity crisis, central banks can purchase debt thereby producing liquidity; and they may coordinate with their own country's treasury to purchase government debt assets which may be used to fund government driven activity to stimulate the economy. The risk in debt-based currency systems is that central bank purchasing activity becomes captive to treasury funding needs. Money supply can be increased with the DeKo by the purchase of electricity delivery assets. These purchases may be cheaper during a contraction. Large delivery purchases may reduce the cost of electrical energy and act as a potential stimulus.

6 - Conclusion

The DeKo is designed to be a harder currency than debt-backed currencies. By the same token, DeKo-based currency portfolios aim to be more stable than commodity-based assets such as gold. The DeKo uses assets representing electricity delivered as a store of value combined with high social utility. A central bank holding a DeKo portfolio offers the benefits of electrical energy infrastructure investments.

Generating and delivering electricity has more social utilitarian value than stimulating the mining of precious metals. Advances in electrical energy delivery, efficiency and management are more socially beneficial than digging more pieces of metal out of the ground only to put them back into the ground in vaults.

The DeKo carries electricity generation and delivery risks which can and are in practice mitigated via a combination of incentives and penalties. The ideal DeKo outcome leads to cheaper electricity in the developed and developing world while currencies and economies become long term stable.

This paper poses arguments in favor of the DeKo concept. Related technical concepts to explore along the adoption path revolve around electricity asset portfolio and delivery normalization, risk management techniques, and migration policies, to engage the virtuous circle of value stability and economic growth which is the promise of the DeKo concept.

7 - Appendix

Spot Gold Prices (USD)

Annual High and Low Gold Bullion Prices Since 1972

Year	High	Low	% Increase from low-high
1972	$70.00	$44.00	**59%**
1973	$126.00	$64.00	**97%**
1974	$195.00	$117.00	**67%**
1975	$185.00	$135.00	**37%**
1976	$142.00	$102.00	**39%**
1977	$168.00	$127.00	**32%**
1978	$243.65	$165.70	**47%**
1979	$524.00	$216.55	**142%**
1980	$850.00	$474.00	**79%**
1981	$599.25	$391.25	**53%**
1982	$488.50	$296.75	**65%**
1983	$511.50	$374.25	**37%**
1984	$406.85	$303.25	**34%**
1985	$340.90	$284.25	**20%**
1986	$442.75	$326.00	**36%**
1987	$502.75	$390.00	**29%**
1988	$485.30	$389.05	**25%**
1989	$417.15	$358.50	**16%**
1990	$423.75	$345.85	**23%**
1991	$403.00	$344.30	**17%**
1992	$359.60	$330.20	**9%**
1993	$406.70	$326.10	**25%**
1994	$397.50	$369.65	**8%**
1995	$396.95	$372.40	**7%**
1996	$416.25	$367.40	**13%**
1997	$367.80	$283.00	**30%**
1998	$314.60	$273.40	**15%**
1999	$323.50	$252.80	**28%**
2000	$325.50	$264.10	**23%**
2001	$291.45	$256.65	**14%**
2002	$342.75	$277.75	**23%**
2003	$417.25	$319.90	**30%**
2004	$454.20	$375.00	**21%**
2005	$536.50	$411.10	**31%**
2006	$725.00	$524.75	**38%**
2007	$841.10	$608.40	**38%**
2008	$1,011.25	$712.50	**42%**
2009	$1,212.50	$810.00	**50%**
Median			**30%**
Average			**37%**

http://www.onlygold.com/tutorialpages/PicesSince1972FS.htm

Top Countries by Electricity Production from Renewable Sources

Country	Year	% of Total Generation	Hydro (GWh)	Wind (GWh)	Biomass (GWh)	Solar (GWh)	Geothermal (GWh)	Total Renewable (TWh)
Albania	2008	100.00%	3,850					3.85
Iceland	2009	100.00%	12,279				4,553	16.832
Lesotho	2008	100.00%	200					0.2
Paraguay	2008	100.00%	54,909					54.912
Tajikistan	2010	100.00%	16,400					
Bhutan	2008	99.97%	7,063					
Mozambique	2008	99.92%	14,963					
Zambia	2008	99.71%	9,569					
Nepal	2008	99.67%	3,042					
Democratic Rep. of the Congo	2008	99.42%	7,409					
Burundi	2008	99.04%	206					
Norway	2009	96.63%	126,077	977	277			
Angola	2008	96.45%	3,804					
Belize	2008	94.88%	204					
Kyrgyzstan	2010	93.30%	11,254					
Costa Rica	2008	93.15%	7,313	188	78		1,075	
Laos	2008	92.46%	3,680					
Brazil	2009	88.88%	387,078	1,374	21,354	0	0	409.806
Ethiopia	2008	88.18%	3,263				13	
Malawi	2008	86.58%	1,451					
Colombia	2008	85.66%	43,085	51	561			
Georgia	2008	85.50%	7,090					
Republic of the Congo	2008	82.08%	371					0.452
Central African Republic	2008	81.25%	0.13					0.16
Cameroon	2008	77.29%	4,190					
New Zealand	2011	76.73%	24,831	1,930	567		5,770	33.097
Ghana	2008	75.09%	6,133					
Uganda	2008	74.95%	1,631					
Namibia	2008	70.82%	1,556					
Austria	2008	70.02%	40,678	2,014	4,264	28	2	
Venezuela	2009	69.57%	85,839	0	0	0	0	85.839
Fiji	2009	68.04%	660					
Madagascar	2008	66.82%	735					
Canada	2009	64.23%	363,241	3,592	7,582	63	0	374.478
Ecuador	2008	64.12%	11,181	3	397			
Panama	2008	63.29%	3,933		18			
Kenya	2008	62.53%	2,821		305		1,120	
Afghanistan	2008	62.50%	520					
El Salvador	2008	62.24%	2,018		100		1,443	
Latvia	2008	62.10%	3,078	56	42			
Burma	2008	62.06%	3,988					
Uruguay	2008	61.92%	4,460		787			
North Korea	2008	61.85%	13,927					
Tanzania	2008	61.39%	2,628					
Guatemala	2008	61.33%	3,675		1,474			
Peru	2008	60.53%	18,850	1	472			
Sweden	2009	60.42%	64,473	2,361	11,321	5		
Togo	2008	58.60%	90		2			
Switzerland	2009	58.52%	35,315	18	2,314	32		
Montenegro	2008	57.52%	1,530					
Mali	2008	56.12%	275					
Suriname	2008	55.38%	875					
Zimbabwe	2008	54.64%	4,220					
Guinea	2008	54.35%	500					
Portugal	2010	52.00%	16,249	9,024	2,191	213	173 (2009)	28.233

http://www.eia.gov/cfapps/ipdbproject/IEDIndex3.cfm?tid=2&pid=2&aid=12

8 - Frequently Asked Questions

1. What is a DeKo?
A DeKo is an issued currency that represents a share of a portfolio of electrical energy assets commonly in the form of standardized Power Purchase Agreements (PPAs) approximating the delivery of 10 kW•hs. DeKo assets are not the fuel that produces electricity or electrical power plants, but rather they are the claims on the delivery of electricity at a certain location, rate and period of time from an electricity generator to an off-taking party.

2. How does a PPA work?
A PPA is a contract between two parties, one that generates electricity for the purpose of sale (the seller) and one that purchases and receives electricity (the buyer or off-taker). The PPA defines all of the commercial terms for the sale of electricity between the two parties, including when the project will begin commercial operation, schedule for delivery of electricity, penalties for under delivery, payment terms, and termination. A PPA is the principal agreement that defines the revenue and credit quality of an electricity generating project and is thus a key instrument of project finance.

3. Why is the DeKo backed by PPAs instead of fuel, utility company bonds or owning the electricity generating facilities outright?
Fuel is potential energy. PPAs represent claims on delivered electricity which is the instantaneous capability to do work. There are additional credit, legal, compliance, and managerial risks represented in owning utility company bonds or electricity generating facilities that are mitigated by backing the DeKo with PPAs.

4. How are DeKos issued?
Currency is issued to pay power generators at a fixed rate for the electricty they deliver. In return, the central bank collects currency for the delivery of electricity at the market rate. The introduction of a DeKo-based currency would most likely start with a central bank's purchase of PPAs.

5. What are the prerequisites for a country to issue DeKos?
- A judicial system with enforceable legal contracts
- Dependable electricity generation capacity
- Open electricity production and distribution markets
- A credible central bank committed to value stability

6. Can current central banks experiment with the DeKo approach?
Central banks can start by purchasing and holding DeKo compliant securities meeting DeKo delivery standards. No changes need to happen to physically issued currency or regulation. A token purchase of $100 million or $1 billion of high grade electricity deliverables by a central bank starts the process.

7. How does the DeKo compare to a Fiat currency?
The integrity of a Fiat currency is a function of the underlying asset base relative to the issued and outstanding currency. A kilowatt hour today has the same approximate functional utilitarian value as a kilowatt hour tomorrow; the same can't be said for government bond interest payments that vary in value relative to fiscal and economic circumstances on a forward basis. The assumption is that the utilitarian value of electricity can be a more stable store of value for a currency on a forward basis than gold or debt alone.

8. Can't central banks just over-issue DeKos?
Central bank currency over-issuance can occur regardless of the underlying asset base. Transparency of the asset base and clear communication is required for central bank integrity. If the central bank loses credibility, no particular asset will insure the value of a currency.

9. What is the citizen experience using DeKos?
Current notes and coins issued stay the same for a DeKo-backed currency. Functionally for citizens in the near term, the DeKo looks and works like existing debt-backed currencies.

10. Would the entire central bank balance sheet consist of electricity generating assets?
The central could determine the mix of assets it desired. The market would likely signal to the central bank which mix it deemed to be the most stable and viable for retaining the currency's long term value. This signal would show up in the curve and rate structures associated with the currency.

11. What happens if a supplier fails to deliver electricity as per the PPA?
The PPA's contract terms for fail to deliver identify the associated penalties and damages owed to the parties. This is usually a short term event and has limited impact on the value of electricity delivered in the long run in countries with dependable electricity generation capacity and open electricity production and distribution markets.

12. What is the correct kW·h per issued DeKo outstanding holding ratio?
A 10yr average of consumer electricity in inflation adjusted prices could be used as starting point. It is believed a slight under-issuance / over-collateralization with fewer outstanding DeKos relative to PPA assets would be required to reflect failure to deliver and other associated risks. This is a very conservative position for a central bank to hold.

13. PPAs aren't standardized. How would a central bank deal with this condition?
A central bank can develop standardized PPA criteria similar to electricity futures contracts to insure asset quality and integrity.

14. Will an electricity-backed currency cause societies to waste electricity?
Utility companies would still be responsible for the transmission and distribution of electricity and have an incentive to ensure that electricity is not wasted. "Wasted" electricity occurs typically when electricity is subsidized to the point where it is allocated to non-productive uses. The PPA structure would not likely distort the electricity market in such a way as to lead to waste.

15. Would the PPA act as a pass-through mechanism for the DeKo?
PPAs would be the legal claim pass-through mechanism where the central bank (intermediary) pays electricity generators long term fixed rates while selling at market prices.

16. Will an electricity-backed currency increase the probability of black-outs?
The impact to the smooth operation of almost all companies, households, and governments provides an incentive to reduce the occurrence of black-outs. PPAs require high quality delivery and performance by supplier and off-taker. It is in everyone's long term interest to maintain grid and delivery stability.

17. Will an electricity-backed currency reduce the incentive to improve electricity generation?
The natural depletion of fossil fuel electricity generation could provide an incentive for replacement by renewable sources. Renewables-backed DeKos may trade at a premium due to the mitigated fuel risk going forward.

18. Is an electricity-backed currency dependent on whether local electricity markets are regulated or deregulated?
Electricity markets are regulated in that they operate in legal environments. A regulated competitive environment which has curbs in place to limit monopolistic abuses is likely the best regulatory framework.

19. Would the central banks control the generation of electricity, need to store electricity or have a fixed price on electricity?
No. The goal of central banks would be to maintain a portfolio equivalence ratio of 10 kW•hs delivered, with minimal failure to deliver risk relative to each DeKo-backed note or coin issued physically or electronically.

20. Will the central bank distort the electricity market with large purchases of electricity generating assets?
The central bank would have limits placed on the percentage of delivery it would control in the spot market. In addition, the central bank's delivery locations would be spread out to limit monopolistic distribution. The goal is to have minimal market distortion of the underlying asset class which the central bank owns.

21. What happens if the currency collapses or is at risk of default?
A currency collapse (loss of purchasing value) could have multiple sources. Depending on the cause of the collapse, an appropriate response would be taken by the central bank. Most currency collapses are related to a loss of confidence in the government's ability or willingness to pay debt, over-issuance of currency relative to underlying reserves or a sudden outflow of Foreign Direct Investment (FDI). Debt related issues become less significant with a DeKo-backed currency. FDI outflows are more short term problems of a loss of faith in the economy. The DeKo's loss in external value in such a situation may be a boon to the country's exporters while making domestic assets cheaper for foreign investors.

22. What happens if the economy contracts leading to decreased electricity demand?
Reduced electricity demand is often associated with GDP declines. The reduced demand would lower the price of the DeKo, which would increase the exporting ability of the country while at the same time making domestic assets more appealing. Cheaper electricity as a domestic economic input should mean improved economic throughput going forward.

23. What happens if there are no off-takers for the electricity?
The off-takers are managed by the free market. Most electricity markets have marginal suppliers who are off-line and only come online to supply peak loads. The clearing rate of electricity and the central bank would most likely be supplying baseload equivalent electricity.

24. What are the benefits for consumers and producers of electricity?
A properly regulated market with no monopoly positions would see a slightly cheaper cost of capital for financing reflecting the credit spread between traditional PPA owners and the DeKo central bank. Stable prices and slightly reduced funding for capital investment in transmission and distribution would emerge due to the high quality rating of the central bank.

25. What happens if electricity becomes significantly cheaper / expensive?
Most electricity prices are long term stable. Even generating revolutions such as significantly cheaper fuel etc. rarely induce a price or demand shock across the long term curve of prices. If electricity were to become significantly cheaper to produce in absolute terms, it is assumed the increased use of electricity would relate to an increase GDP throughput due to improvement in total-factor productivity (TFP). Such a situation over a long or short period would likely see an expansion in the narrow money base reflective of a sustainably expanded economy.

If the price of electricity were to rise in absolute terms due to long term fuel or cost increases, the economy and money supply would likely shrink. The DeKo would increase in price in proportion to the CPI and the relative decline in GDP would over the long term be met with a shrinking of the future issued money supply.

26. What are the threats of politically captive electricity regulators?
Independent regulators with the long term interests of consumers are optimal for long term economic growth. Captive regulators are a risk which would likely put pressure on the currency's price to the detriment of electricity consumers or producers. This devaluation risk is similar to the declines in value associated with captive central banks which consume domestic government debt regardless of the value of that debt.

27. How will the DeKo alter monetary policy options?
Monetary policy is the process by which the monetary authority of a country controls the supply of money, often targeting a rate of interest for the purpose of promoting economic growth and stability. The DeKo has less flexibility for monetary over-issuance (devaluation). The central bank could still use its rate and reserve policy for borrowing DeKos suited to control broad money.

28. How will the DeKo alter fiscal policy options?
The two main instruments of fiscal policy are government taxation and expenditure.
A DeKo-backed currency will not alter fiscal policy options available to a government.

29. How will the DeKo alter broad money constituents?
Broad money is a measure of the money supply that includes more than just physical money such as currency and coins. It generally includes demand deposits at commercial banks, money held in easily accessible accounts and non-cash components that can be converted into cash easily. Broad money rates in the private sector and public debt offering would still be determined by a mix of supply and demand above the risk free rate.

30. How does a central bank set interest rate policy with a DeKo?
The standard monetary tools of bank reserve requirements, short term rates such as swaps and repos rate tools are still operational with a DeKo.