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The Digital Euro and Energy Considerations: Can the ECB Introduce the Digital Euro Considering the Potential Energy Requirements?

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Abstract

The ECB has two mandates its primary and secondary mandate. Its primary mandate has been the focus of many discussions but its secondary mandate is less frequently discussed. Nevertheless this mandate has important objectives and should not be considered obsolete. This article examines the legal status of the secondary mandate of the ECB with regard to climate change. In particular this article will consider the role of the secondary mandate with regard to the Digital Euro and energy targets. The Digital Euro can be used as a monetary tool and improve payment systems. However, depending on its design the Digital Euro can use a considerable amount of energy. This article concludes that if the design of the Digital Euro does not impact the monetary objectives, the secondary mandate of the ECB determines the design of the Digital Euro.

Keywords: ECB; European Central Bank; digital euro; climate law; energy; primary mandate; secondary mandate

A. Introduction

This article will examine the impact of the renewable energy targets upon the European Central Bank's (ECB) decision making. The ECB's mandate is generally evaluated through its primary mandate which is price stability. Despite the importance of the primary mandate, price stability is not the only mandate given to the ECB. In addition to its primary mandate the ECB has been given a secondary mandate. The secondary mandate includes various difficult to define objectives, such as balanced economic growth and social progress. The status of the secondary mandate is largely undefined. In particular, to what extent the secondary mandate binds the ECB in its decision-making. It would be too broad to focus on the entirety of the secondary mandate's list of objectives. This article has therefore chosen to focus on the objective of improvement of the quality of the environment and specifically climate change.

The objective of climate change mitigation is an interesting one. It is specific enough to agree on the contours of its definition: The reduction of greenhouse emissions. It is furthermore a topic of current debate within ECB policy. The ECB has increased the emphasis on the fight against

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climate change. The recent purchasing programs, however, were criticized for focusing on carbon intensive sectors.¹ This has led some to wonder whether the ECB can be legally forced to increase its emphasis on green decision-making. This question will increase in importance with the potential introduction of an energy intensive new monetary tool: The digital euro.

Private virtual currencies are slowly integrating into society. There are many potential advantages to virtual currencies in particular to cryptocurrencies. Cryptocurrencies are based upon a blockchain and do not require verification by an intermediary. The cryptocurrencies can be transferred fast and do not require conversion between various jurisdictions. Thus providing a lot of potential advantages for businesses. In particular, cryptocurrencies that are pegged to a fiat currency, the so-called stable coins, provide interesting opportunities. In response to the increase in private virtual currencies central banks have started considering introducing their virtual currencies. These so-called Central Bank Digital Currency (CBDC) aim to prevent a full takeover of private currencies. Thereby aiming to guarantee the use of fiat currencies. Within the Eurozone, the ECB has also launched its investigation into introducing a digital euro.² Whilst there are various potential advantages to digital currencies, there are also several disadvantages. A particular concern is that of energy requirements.

The mining of Bitcoin, perhaps the most famous cryptocurrency, has recently been banned in several jurisdictions.³ In Iran, mining facilities have been banned due to the power outages they caused.⁴ Bitcoin's energy consumption is estimated to be equal to the energy consumption of countries such as The Netherlands or Norway.⁵ The currency has therefore been receiving backlash concerning climate impact.⁶

The high energy consumption of these currencies conflict with the current climate and energy goals. The EU aims to achieve net-zero emissions by 2050.⁷ Part of the climate strategy is to increase the percentage of renewable energy that is used. Increasing the production of renewable energy requires time and investment. An energy consumption increase, such as that required by Bitcoin, thus endangers the energy targets. Depending on its design, the digital euro risks a similar level of energy consumption. There are roughly three different types of design possibilities for the digital euro. The first is one based upon a centralized system. The second possibility is based upon a decentralized blockchain. The third possibility is a combination of a centralized and decentralized system is possible. The question is whether the ECB has to consider the energy requirements when introducing the digital euro. The ECB is subject to the Paris Climate Agreement and must abide by the legal framework set out in the Treaties. Nevertheless the Treaty on the Functioning of the European Union (TFEU) also provides the ECB with a high level of independence.

¹Javier Solana, *A Reminder from the Courts for the European Central Bank to Take Climate Change Seriously*, GRANTHAM RSCH INST. CLIMATE CHANGE & ENV'T (May 20, 2020) <https://www.lse.ac.uk/granthaminstitute/news/a-reminder-from-the-courts-for-the-european-central-bank-to-take-climate-change-seriously/>; *The ECB and Climate Change: Outlining a Vision for Success*, POSITIVE MONEY (Apr. 2020) <https://350.org/wp-content/uploads/2020/04/ecb-climate-change-policy-briefing.pdf>.

²Press Release, European Central Bank, Eurosystem Launches Digital Euro Project (2021), <https://www.ecb.europa.eu/press/pr/date/2021/html/ecb.pr210714~d99198ea23.en.html>.

³Marco Quiroz-Gutierrez, *Crypto is Fully Banned in China and 8 Other Countries*, FORTUNE (Jan. 4, 2022) <https://fortune.com/2022/01/04/crypto-banned-china-other-countries/>.

⁴Maziar Motamedi, *Iran Bans Crypto Mining After Summer Power Cuts Strike Early*, ALJAZEERA (May 26, 2021) <https://www.aljazeera.com/economy/2021/5/26/iran-bans-all-crypto-mining-after-summer-power-cuts-strike>.

⁵Cristina Criddle, *Bitcoin Consumes 'More Electricity than Argentina'*, BBC, (Feb. 10, 2021) <https://www.bbc.com/news/technology-56012952>.

⁶Alan Ohnsman, *Bitcoin Tanks After Elon Musk Says Tesla Stops Accepting It Due To Carbon Energy Use*, FORBES (May 12, 2021) <https://www.forbes.com/sites/alanohnsman/2021/05/12/elon-musk-says-tesla-stops-accepting-bitcoin-for-car-purchases-due-to-carbon-energy-use/?sh=607c37b16f85>.

⁷EUR. COMM'N, *2030 Climate Target Plan*, https://climate.ec.europa.eu/eu-action/european-green-deal/2030-climate-target-plan_en (last accessed Oct. 25, 2022)

This article will analyse to what extent the energy targets impact the ECB when implementing monetary policy. In section B, this article will first describe the different design options for the digital euro and their respective estimated energy requirements. Section C will then continue by analysing how the climate goals impact the ECB's primary mandate. Section D will continue by assessing the impact of the climate goals in the secondary mandate. At the end of both section C and section D this article will provide some reflections upon the impact on the asset purchasing program and digital euro. Section E will end with a conclusion reflecting on the legal status objective of mitigating climate change.

B. The Digital Euro

1. Design of the Digital Euro

On July 14, 2021, the ECB launched its research project on the digital euro. The digital euro will be a form of central bank digital currency (CBDC). The exact design for the digital euro is currently being researched and there is no set definition of CBDC. Engert and Fung describe CBDC as a monetary value stored electronically.⁸ In their paper, they describe the two common issues of central bank liabilities as cash and electronic bank deposits.⁹ The ECB currently holds electronic deposits from commercial banks. These accounts are based upon article 17 of the Statute of the ECB.¹⁰ This article states: "In order to conduct their operations, the ECB and the national central banks may open accounts for credit institutions, public entities and other market participants and accept assets, including book entry securities, as collateral."¹¹ This article is broadly formulated, in particular, the term "other market participants" allows for a wide application of article 17. Thus the first option for the ECB's digital euro could be to broaden the scope of the ECB deposits to include a wider range of participants potentially including consumer access. It is also possible to keep the digital euro only accessible to large financial institutions for settlement. The narrowly defined option is unlikely to be chosen. In an earlier report on the digital euro, the ECB expressed a preference a digital euro that can be used for peer-to-peer payment.¹²

There are two general design options. The first is directly through the national central banks (NCB) as a one-tiered system. This option is unlikely to be considered compatible with the legal framework.¹³ The second option is that of operating the digital euro through commercial banks as a two-tiered system. This option is likely to be considered lawful under the ECB's primary mandate.¹⁴ In both options, however, the ECB would be responsible for processing the transactions of the digital euro. The use of a digital euro for consumer payments entails a potentially high volume of daily transactions. In relation to climate change, this means that processing capacity is needed to process these transactions.

The report on the digital euro is relatively vague on how the system will run from a processing point of view. A recent interview with board member Fabio Panetta provides some more details. In the interview, Panetta states that the ECB has been testing with different options. The first is that

⁸Ben Siu-Cheong Fung & Walter Engert, *Central Bank Digital Currency: Motivations and Implications* 1 (Bank of Canada Staff Discussion Paper No. 2017-16, 2017).

⁹*Id.*, at 1.

¹⁰Consolidated Version of the Treaty on the Functioning of the European Union, Protocol (No. 4) On the Statute of the European System of the Central Banks and of the European Central Bank, June 7, 2016, O.J. (C 202), 230–250 [hereinafter *The Statute of the European System of the Central Bank*].

¹¹The Statute of the European System of the Central Bank, art. 17.

¹²Report on a digital euro, EUR. CENT. BANK (Oct. 2020), ~https://www.ecb.europa.eu/pub/pdf/other/Report_on_a_digital_euro~4d7268b458.en.pdf.

¹³Annelieke Anne Marieke Mooij, *A Digital Euro for everyone. Can the European System of Central Banks introduce general purpose CBDC as part of its economic mandate?*, J. OF BANKING REGUL. (2022) <https://doi.org/10.1057/s41261-021-00186-w>.

¹⁴Annelieke Anne Marieke Mooij, *The European Central Bank's Monetary Policy and Central Bank Digital Currency: Can the ECB Lawfully Introduce a Digital Euro Under Its Monetary Mandate?*, 23 IRISH J. OF EUR. L. 163 (2021).

of a centralized system called TIPS. Secondly, the ECB has been testing a decentralized ledger technology (DLT) and a combination.¹⁵ In the interview, Panetta was optimistic concerning the test results. He, however, did not specify what system the ECB would be using or whether it would be a combination of two systems. The energy consumption varies significantly depending on the chosen design.

II. Energy Requirements per Digital Euro Design Option

When compared with other methods of alternative finance, the energy consumption of the digital euro will be a concern. The extent of this concern is however unclear and would depend on the type of system chosen. A decentralized system based upon Proof-of-Work (PoW) verification would be the most energy-consuming.¹⁶ This type of system entails, at its basis, that a mathematical sum needs to be solved to add a new block. The amount of energy that has to be consumed for the transaction to pass is inherent to the design of the system. In 2017, the ING-bank calculated the energy consumption of a single Bitcoin transaction to be 200kWh.¹⁷ This research, however, did not include the additional electricity needed for the cooling of mining facilities. In 2018, De Vries researched the energy consumption of the most popular cryptocurrency: Bitcoin. The estimated findings state that with around 200,000 transactions per day the energy consumption for hashing is 2.55GW.¹⁸ In addition to hashing, mining facilities generate heat. The cooling of the facilities is another energy consumption factor. The amount of energy needed for the cooling process, however, remains largely unknown. Based on the Bitmain mining facility, De Vries, however, estimates the energy consumption to be around 32MW.¹⁹ In his conclusion, De Vries estimates that each transaction will cost approximately 300kWh and potentially reach 900kWh by the end of 2018.²⁰ This prediction, however, does not seem to have realized itself. Sedlmeir, Buhl, Fridgen, and Keller, in 2020, calculated that a single Bitcoin transaction consumes 277kWh.²¹ Thus indicating a potential increase in energy efficiency.

Using Sedlmeir, Buhl, Fridgen, and Keller's calculations the energy consumption of a decentralized digital euro is worrisome. The ECB estimates that its user amount will be 400 million consumers and the total transactions would be hundreds of millions per day.²² A quick calculation²³ demonstrates that the resulting energy usage would be at least 27700GW (or 27.7TW). This is per current estimates, as more transactions will take place, the amount of energy required will go up too. In comparison Hungary annually uses 39.7TW.²⁴ Thus, implementing a decentralised system based on PoW would very quickly require more energy than the country of Hungary. This type of energy consumption can endanger the climate targets. The European Union in 2019 consumed 16910.02TW in total,²⁵ the proposed payment system would therefore add a minimum of 0.16 percent to the EU's energy consumption. The current green energy consumption of the EU is

¹⁵Martin Arnold, *Interview with Fabio Panetta, Member of the Executive Board of the ECB*, FIN. TIMES, (June 20, 2021) <https://www.ecb.europa.eu/press/inter/date/2021/html/ecb.in210620~c8acf4bc2b.en.html>.

¹⁶Johannes Sedlmeir, Hans Ulrich Buhl, Gilbert Fridgen & Robert Keller, *The Energy Consumption of Blockchain Technology: Beyond Myth*, 62 BUS. & INFO. SYS. ENG'R 599, 606 (2020).

¹⁷Teunis Brosens, *Why Bitcoin Transactions Are More Expensive than You Think* ING (Oct. 13, 2017) <https://think.ing.com/opinions/why-bitcoin-transactions-are-more-expensive-than-you-think>.

¹⁸Alex de Vries, *Bitcoin's Growing Energy Problem*, 2 JOULE 801, 801–802 (2018).

¹⁹*Id.* at 802.

²⁰*Id.* at 804.

²¹Sedlmeir, et al., *supra* note 16, at 606.

²²Arnold, *supra* note 15.

²³Calculation based upon 100million transactions per day, the lowest boundary within the area of 100millions.

²⁴*Energy Consumption in Hungary*, WORLDDATA, <https://www.worlddata.info/europe/hungary/energy-consumption.php> (last accessed Oct. 22, 2022).

²⁵*Energy Statistics - an Overview*, EUROSTAT, https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Energy_statistics_-_an_overview.

twenty percent exactly, meeting the EU's climate targets.²⁶ Furthermore, the proposed EU Directive on Renewable Resources plans to facilitate 40GW of Ocean energy and 300GW offshore wind energy.²⁷ The digital euro alone could take up eight percent of this energy. Increasing the energy consumption of the EU makes it more difficult to reach the climate targets. In comparison, the Dutch windmill park in the North Sea has a total capacity of 2459.5MW.²⁸ It would therefore require roughly twelve windmill parks to provide green energy for the digital euro. It would also be the first time that a decentralized system would be used on such a large scale. Thus raising the question of whether it could work.

The PoW concept is not the only possibility for the ECB to base their digital euro on. The second possibility is a decentralized system based upon the Proof-of-Stake(PoS). A PoS system is based not on mining but on validators to approve the transaction. The validators have a so-called "stake" in the transaction. They initially pay the system to become validators. If they approve a fraudulent transaction their stake is decreased. Per correctly approved transactions, they receive a commission. Using such a system would have certain benefits; validators can be selected by the ECB. Requirements on green energy usage could be implemented when attracting such validators. The system itself furthermore only requires a single validator rather than a group of miners. The energy consumption is therefore estimated at 10^3 Joule per transaction rather than the 10^9 Joule required through a PoW-system. The total system by comparison would require 27.7MW, whilst still a significant amount of energy, it is far less than the PoW-system. A PoS system is, furthermore, considered more secure than PoW because it randomly assigns its validators.²⁹ The system nevertheless depends on a system of validators, which carries risks. According to Panetta the ECB has also been experimenting with a centralized system called TIPS.³⁰ Using a centralized system might be a solution to the energy intensity and does not rely on external validators or miners.

The paper by Seldmeir, Buhl, Fridgen, and Keller indicates that the energy consumption difference between a decentralized system and a centralized system is significant.³¹ The decentralized system would require roughly eight times more energy than a centralized system.³² Their paper states that per transaction a centralized system would require nine joules.³³ With 100 million transactions each day, the system required by the ECB would require 1GW per day. Whilst certainly lower the energy requirements are still significant.

Before continuing, a quick note on cash. It is not relevant to go into depth when considering cash. Cash should be considered distinctively different from technical payment systems. The decline of cash is certainly aided by the improvement and increased availability of technology. It is likely the decline of cash will continue regardless of the introduction, or not, of the digital euro. Environmental concerns should not overthrow the necessity of technical advancement. Cash, however, is not without environmental concerns either.³⁴ In particular, copper mining

²⁶Share of Energy from Renewable Sources 2019 Sata, EUROSTAT (Mar. 5, 2021), https://ec.europa.eu/eurostat/statistics-explained/index.php?title=File:Share_of_energy_from_renewable_sources_2019_data,15Jan2021.JPG.

²⁷Commission Proposal for a Directive of the European Parliament and of the Council Amending Directive (EU) 2018/2001 of the European Parliament and of the Council, Regulation (EU) 2018/1999 of the European Parliament and of the Council and Directive 98/70/EC of the European Parliament and of the Council as Regards the Promotion of Energy from Renewable Sources, and Repealing Council Directive (EU) 2015/652, at pmb. ¶ 8, COM (2021) 557 final (July, 14 2021).

²⁸Windparken op de Noordzee, RIJKSDIENST VOOR ONDERNEMEND NEDERLAND (Mar. 31, 2022) <https://www.rvo.nl/onderwerpen/windenergie-op-zee>.

²⁹Usman W. Chohan, *Proof-of-Stake Algorithmic Methods: A Comparative Summary*, 1, 3 (Univ. of New S. Wales Discussion Paper, Feb. 28, 2018).

³⁰Arnold, *supra* note 15.

³¹Seldmier, et al., *supra* note 16, at 606.

³²*Id.*

³³*Id.*

³⁴Randall Hanegraaf, Nicole Jonker, S. Mandley & Jelle Miedema, *Life Cycle Assessment of Cash Payments*, 2 (DNB Working paper No. 610, Oct. 2018).

for the use in coins has a significant effect upon the environment.³⁵ The use of banknotes has a lesser impact on the environment.³⁶ From an environmental perspective, the best alternative to digital payments is to solely use banknotes. It is, however, highly unlikely that the modern economy could survive without electronic payment systems. The option of cash as an environmentally friendly alternative will therefore not be further considered.

III. Reflections

Considering the likelihood of the introduction of the digital euro there are questions with regard to energy targets. The first is: Whether the digital euro can be lawfully introduced with regard to the energy considerations? The second question is: Whether the legal framework requires the ECB to use the least energy-consuming operating system?

The digital euro is furthermore not the only consideration with regard to energy questions. The Asset Purchasing Programme raises similar questions. The Programme was implemented in mid-2014 response to the euro-crisis.³⁷ The Programme was reviewed by the Court of Justice of the European Union (CJEU) and judged as part of the ECB's primary mandate.³⁸ The purchases conducted by the ECB are interesting to consider in relation to energy.

In their research, Matikainen, Campiglio, and Zenghelis note the percentage of purchases according to the Bloomberg Industrial Classification System (BISC).³⁹ The most energy intensive sectors are the energy sector, industrial sector, and food and materials sector.⁴⁰ Around 34.53 percent of the ECB's asset purchases was conducted in the most energy intensive industries.⁴¹ In particular, it is noteworthy that no bonds were purchased from the renewable energy sector. Therefore, Matikainen, Campiglio, and Zenghelis recommend considering changing the purchasing strategy. Their article discusses changing the risk criteria, whereby social elements could be taken into consideration.⁴² This criteria revision is *prima facie* an attractive option. The ECB as part of the EU is in service to the general welfare of the people. It furthermore has the, secondary, objective to promote a balanced growth. To consider social elements, including climate change, in the ECB's strategy is therefore an interesting option. It is, however, not a suggestion without risk. In the current circumstances it is argued that a green monetary policy risks distorting financial markets. This distortion is due to the lack of green bonds that are currently available.⁴³ To include climate change as an objective within ECB is therefore complex. In particular, the question to what extent climate goals have to be incorporated and can be enforced within ECB policy making. The next paragraphs will therefore discuss the climate laws in relation to the ECB's primary mandate.

³⁵*Id.* at 16.

³⁶*Id.* at 19

³⁷EUROPEAN CENT. BANK, *Asset Purchase Programme* <https://www.ecb.europa.eu/mopo/implement/app/html/index.en.html> (accessed June 27, 2022)

³⁸Case C-62/14, Peter Gauweiler a.o. v. Deutscher Bundestag, ECLI: EU:C:2015:400 (June 16, 2015).

³⁹Sini Matikainen, Emanuele Campiglio & Dimitri Zenghelis, *The Climate Impact of Quantitative Easing*, GRANTHAM RSCH. INST. ON CLIMATE CHANGE & ENV'T 1 (May, 2017) https://www.lse.ac.uk/granthaminstitute/wp-content/uploads/2017/05/ClimateImpactQuantEasing_Matikainen-et-al-1.pdf.

⁴⁰*Industrial Energy Consumption, in International Energy Outlook 2016*, US ENERGY INFO. ADMIN 113 (May 2016) [https://www.eia.gov/outlooks/ieo/pdf/0484\(2016\).pdf](https://www.eia.gov/outlooks/ieo/pdf/0484(2016).pdf).

⁴¹Matikainen et.al, *supra* note 39, at 14.

⁴²*Id.* at 20.

⁴³Lena Boneva, Gianluigi Ferrucci & Francesco Paolo Mongelli, *To Be or Not To Be "Green": How Can Monetary Policy React to Climate Change?* 1, 24 (ECB Occasional Paper No. 2021/285, Nov. 2021).

C. The ECB's Primary Mandate & Climate Laws

I. The Applicability of Climate Targets

The first question this article will answer is whether the digital euro can be lawfully introduced with regard to energy considerations? This article considers the digital euro and other policies introduced by the ECB based upon the primary mandate. For the digital euro to be lawfully introduced the ECB has to abide by the primary mandate of the ECB and it cannot be contrary to other legal obligations of the ECB. The ECB's mandate is vested within article 127 TFEU. It states that its main objective shall be to safeguard price stability. This objective has been defined by the ECB as inflation close to but under two percent. As a result of the recent strategy review, this objective has been set to medium-term two percent.⁴⁴ The primary mandate is the main objective of the ECB. It is, therefore, the question if and to what extent other regulations such as the Paris Climate Agreement applies.

In the Paris Climate Agreement, the signatories agree to keep global warming under two but preferably under 1.5 degrees Celsius. The signatories further agree to become climate neutral by 2050.⁴⁵ The strategy to achieve climate neutrality as outlined in European Commission's The Green Deal. The Green Deal includes aims such as a zero-pollution plan.⁴⁶ To reduce emissions the Commission has set targets for renewable energy. These climate targets from the Commission state that forty percent of the EU energy consumption should be renewable by 2030.⁴⁷

The ECB has stated that it considers itself bound by the Paris Agreement.⁴⁸ The Paris Agreement, however, discusses the ultimate climate goal of temperature moderation. It includes the obligation to stimulate "low emissions development,"⁴⁹ but no specific targets on renewable energy. These targets were specified by the Commission for the European Union. Thus, raising the question of whether these targets created by the Commission can bind the ECB when it introduces a digital euro, based upon its primary mandate. To answer this question, it is necessary to discuss the ECB's independence. The independence of the ECB is founded upon the idea that central banks can better control inflation when they are independent of policymakers.⁵⁰ By creating a level of independence, central banks are separated from the "electoral cycle" which allows long-term price stability.⁵¹ Article 130 of the TFEU, therefore, prohibits the ECB from seeking or taking instructions from other EU institutions and the Member States. The ECB's independence is created to ensure price stability. It is therefore not a given that EU legislation binds the ECB. However, this independence is not absolute in shielding the ECB from other EU legislation. The limitation on independence flows forth from the *OLAF* case.⁵²

The *OLAF* case concerned the European Anti-Fraud Office which wanted to inspect the ECB financial accounts. The ECB however refused cooperation. The ECB provided two arguments that are of further interest to this article. The first argument is that the ECB is an independent agency

⁴⁴EUR. CENT. BANK, The ECB's Monetary Policy Strategy Statement (2021) https://www.ecb.europa.eu/home/search/review/html/ecb.strategyreview_monpol_strategy_statement.en.html.

⁴⁵*The Paris Agreement*, U.N. CLIMATE CHANGE <https://unfccc.int/process-and-meetings/the-paris-agreement/the-paris-agreement> (last accessed Oct. 22, 2022).

⁴⁶*Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: A blueprint to Safeguard Europe's Water Resources*, at 14, COM(2021) 0673 final (Dec. 11, 2019).

⁴⁷*Renewable Energy Targets*, EUR. COMM'N https://energy.ec.europa.eu/topics/renewable-energy/renewable-energy-directive-targets-and-rules/renewable-energy-targets_en (last accessed Oct. 25, 2022).

⁴⁸See Positive Money Europe, *Draghi: 'The ECB is a Party of the Paris Agreement'*, YOUTUBE (Mar. 1, 2021) https://www.youtube.com/watch?v=Z9yzqUDl2DA&ab_channel=PositiveMoneyEurope.

⁴⁹Paris Agreement, U. N. art. 2(b) (2015) https://unfccc.int/sites/default/files/english_paris_agreement.pdf.

⁵⁰Alex Cukierman, Bilin Neyapti & Steven B. Webb, *Measuring the Independence of Central Banks and Its Effect on Policy Outcomes*, 6 WORLD BANK ECON. REV. 353(1992).

⁵¹William D. Nordhaus, *The Political Business Cycle*, 42 REV. OF ECON. STUD. 169 (1975).

⁵²Case C-11/00, *Commn v. European Cent. Bank*, ECLI:EU:C:2003:395, ¶¶ 107–108 (July, 10, 2003).

outside of EU legislation.⁵³ The second argument is that if the ECB were audited that would harm its independence.⁵⁴ The CJEU dismissed both of these arguments. The *OLAF* judgement first considered that the ECB was given legal personality and the assignment to establish and execute monetary policy.⁵⁵ This, however, did not exclude the ECB from the European Union's legal framework. The CJEU stated that "It follows that the ECB, pursuant to the EC Treaty, falls squarely within the Community framework."⁵⁶ The CJEU further considered that the anti-fraud provisions in the Treaty were aimed at combatting fraud within the financial interests of the EU.⁵⁷ The CJEU further considered that the independence of the ECB safeguards the institution from political influence.⁵⁸ However, the ECB is not completely separated from EU legislation.⁵⁹ The CJEU refers to the secondary objectives in article 105(1) EC, now article 127 TFEU. Stating that "it is evident from Article 105(1) EC that the ECB is to contribute to the achievement of the objectives of the European Community."⁶⁰ The ECB is therefore not immune to the general objectives of the Union.

To this end, the ECB can be impacted by legislation that is adapted by other organs. Specifically, the CJEU states: "It follows from the foregoing that there are no grounds which prima facie preclude the Community legislature from adopting, by virtue of the powers conferred on it by the EC Treaty and under the conditions laid down therein, legislative measures capable of applying to the ECB."⁶¹ The ECB is, therefore, not completely immune from other legislation. The question thus becomes to what extent the climate targets and energy targets apply to the ECB. The ECB is a party to the Paris Agreement but the targets are phrased by the Commission. The CJEU in *OLAF* stated that the legislator can create legislation applicable to the ECB. The first question is whether the legislation is, aimed to be, applicable to the ECB. The second is whether the various targets should be considered a political influence.

II. Is the ECB Subject to the Renewable Energy Targets?

The first question, however, is whether the ECB is subject to the energy targets. The energy targets are addressed at the Member States. Not at the Member States and the EU institutions. The energy requirements of other institutions such as the Commission and Parliament are met by the Member States in which they are located. The Commission takes an institutional responsibility but it does not demand other institutions to do the same. Thus, raising the question of why the ECB as an institution should be considered an institutional subject to the climate targets. The alternative is that the Member State where the ECB aims to run the digital euro from is responsible for the energy consumption. This would mean there is no need for the ECB to internalize the costs of the energy. Meaning that the system's power consumption will be part of the Member State where it is connected to the grid. It is therefore the Member State's responsibility to compensate for thirty-two percent of that power by 2030. With this example a clear difference between the digital euro and other programs can be identified.

The digital euro can be run either from a centralized server or through a network of decentralized nodes. If a centralized server is used the server plugs into a single grid. If a network of decentralized nodes are used these nodes can technically be placed throughout the world. From a security point of view, it is unlikely that the ECB will use nodes outside of its own control. The

⁵³*Id.* ¶ 113

⁵⁴*Id.* ¶ 92

⁵⁵*Id.*

⁵⁶*Id.* ¶ 100

⁵⁷*Id.* ¶ 134

⁵⁸*Id.*

⁵⁹*Id.* ¶ 135

⁶⁰*Id.*

⁶¹*Id.* ¶ 136.

nodes will, therefore, be running within the remit of the ECB and thus also within a single country. The asset purchases on the other hand are a pan-eurozone project. The corporate asset purchase are conducted by six national central banks (NCBs) throughout the Eurozone.⁶² The impact upon the climate goals are therefore spread over the various Member States.

If, however, the ECB has to consider itself bound by climate change when conducting monetary policy the ECB would be responsible for internalizing the costs of the energy. Meaning there would be a duty for the ECB to invest in sources of renewable energy. The argument can be made that it makes no difference as the ECB could simply “buy” green energy. This argument, however, fails to take the reality of the energy market into account. Green energy is scarce and building up sources of renewable energy takes time and investment. Whilst this would be a high burden for the responsible Member State, the energy targets are nevertheless aimed at the Member States.⁶³ The Regulation from the *OLAF* case specifically addressed fighting fraud within the institutions.⁶⁴ It was formulated to apply broadly to all institutions and hence that included the ECB.⁶⁵ The Renewable Energy Directive on the other hand clearly states “Member States shall collectively ensure that the share of energy from renewable sources in the Union’s gross final consumption of energy in 2030 is at least 32%.”⁶⁶ It cannot be considered that this includes a duty upon the individual institutions—including the ECB. Furthermore, the financial aid given to promote a greener economy is also directed towards Member States.⁶⁷ Not to the institutions themselves. However, the ECB is constitutionally different.

The constitutional status of the ECB is different from that of other institutions. The constitutional status of the ECB allows the ECB to take legally binding decisions through its own decision making organs. This characteristic differentiates the ECB from other institutions. As the other institutions act on behalf of the EU.⁶⁸ Thus one can argue that due to its different status the ECB is responsible for its climate targets. Furthermore, whilst the energy target is aimed at the Member States this does not *per se* mean that the ECB can introduce the digital euro. Ioannidis, Murphy, and Zilioli argue that the secondary mandate of the ECB carries a negative duty. Namely, the prohibition for the ECB’s monetary policies to undermine EU policies.⁶⁹ The introduction of an energy-consuming digital euro may undermine this policy. Additionally, Solana argues that the ECB has to incorporate environmental aspects into its monetary policy. In his work, he bases this conclusion upon article 11 of the TFEU.⁷⁰ However, he also considers that article 11 of the TFEU does not take priority over the goals listed in article 3 of the TEU.⁷¹ He, therefore, considers that article 11 of the TFEU should be read as a goal compatible with those in article 3 of the TEU.⁷² Therefore, it seems that article 11 of the TFEU does not carry priority but is rather a part of the secondary objectives of the ECB. The secondary mandate is not prioritized over the primary mandate and will be covered in the next section. Sjøfjell argues that there is a general duty for the EU institutions to work towards the overall objectives, including article 11 of the

⁶²ECB Corporate sector purchase programme (CSPP) – Questions & Answers, EUR. CENT. BANK (Sept. 19, 2022) <https://www.ecb.europa.eu/mopo/implement/app/html/cspp-qa.en.html>.

⁶³Commission Proposal Amending Directive (EU) 2018/2001, *supra* note 27.

⁶⁴Commission Regulation 1073/1999 of the European Parliament and of the Council of 25 May 1999 concerning investigations conducted by the European Anti-Fraud Office (OLAF), Art. 1(3), 1999 J.O. (L 136) 31.

⁶⁵Case C-11/00, *Comm’n v. European Cent. Bank*, ECLI:EU:C:2002:556, ¶¶ 50–51 (Oct. 3, 2002) (Opinion AG Jacobs).

⁶⁶Commission Proposal Amending Directive (EU) 2018/2001, *supra* note 27, at art. 3(1).

⁶⁷Press Release, European Commission, Modernisation Fund invests €2.4 Billion to Accelerate the Green Transition in 7 Beneficiary Countries (June 8, 2022) https://ec.europa.eu/commission/presscorner/detail/en/ip_22_3488.

⁶⁸Christoph S. Weber & Benedikt Forschner, *ECB: Independence at risk?*, 49 *INTERECONOMICS* 45 (2014).

⁶⁹Michael Ioannidis, Sarah Jane Hlásková Murphy & Chiara Zilioli, *The Mandate of the ECB: Legal Considerations in the ECB’s Monetary Policy Strategy Review*, 3, 14 (ECB Occasional Paper Series No. 276, Sept. 2021).

⁷⁰Javier Solana, *The Power of the Eurosystem to Promote Environmental Protection*, 30 *EUR. BUS. L. REV.* 547 (2019).

⁷¹*Id.* at 559

⁷²*Id.*

TFEU.⁷³ This interpretation of working towards environmental improvement is further strengthened by the status of climate protection as a human right.

III. Climate Mitigation as a Human Right

The Dutch, Irish, and French national courts considered that the climate agreements could be enforced through the European Convention on Human Rights (ECHR), specifically articles 2, right to life, and 8, right to private life.⁷⁴ The articles from the ECHR, however, do not apply to the ECB. Whilst each member state has ratified the ECHR; the EU has not. This means that the ECB, as an EU institution, does not have to abide by the ECHR. The ECB is, however, bound by the Charter of Fundamental Rights of the European Union (“the EU Charter”).⁷⁵ As with the ECHR, the EU Charter contains the right to life, article 2, and the right to a private and family life, article 7.⁷⁶ Additionally, the EU Charter codifies the right to environmental protection, article 37.⁷⁷ Whilst this gives an argument to the general application of climate laws to the ECB, it does not answer the question of whether the energy targets apply.

In its decision, the Dutch Supreme Court used the reports from the Intergovernmental Panel on Climate Change (IPCC) to establish the substance of the right to life and private life concerning climate change.⁷⁸ It considered that the emission reduction targets set by the IPCC were the minimum targets for the Netherlands.⁷⁹ The IPCC, however, does not set targets for the use of renewable energy.⁸⁰ Therefore the ECB cannot be held liable to specific energy targets through the Paris Agreement in combination with fundamental rights. Nevertheless, the ECB can perhaps be held liable using a fair balance test.

Fundamental rights carry positive and negative obligations for the institutions. Thus raising the question of whether the ECB has the negative obligation of not introducing the digital euro, or the positive duty to invest in renewable energy when it does. The positive and negative duties are closely related. To answer the question of negative duty or positive obligation boils down to a fair balance test.⁸¹ The fair balance test will balance the interest of the ECB to introduce the digital euro against the need for emission reductions. The ECB is likely to argue that it has a monetary interest in introducing the digital euro. However, a plaintiff would likely argue its interest in the climate targets being met, including the energy targets. The question is whose interests would prevail.

The CJEU has not yet ruled on climate change with regard to fundamental rights, the European Court of Human Rights (ECtHR) has. Article 52(3) of the EU Charter states that in case of

⁷³Beate Sjäfjell, *The Legal Significance of Article 11 TFEU for EU Institutions and Member States* 51, 56 (Univ. of Oslo Faculty of L. Stud. Rsch. Paper Series No. 2014-38, 2014).

⁷⁴See HR 20 December 2019, NJ 2020, 14 m.nt J. Spier (Urgenda)(Neth.); Friends of the Irish Env't v. Gov't of Ireland, Judgment of 31 July 2020, [2020] IESC 49; Conseil d'Etat[Council of State], *Commune de Grande-Synthe v. France* <http://climatecasechart.com/non-us-case/commune-de-grande-synthe-v-france/> (Pending); Louis Mason, *The French 'Case of the Century' Ushers in New Era of Environmental Litigation*, UNIVERSAL RTS. GRP (Feb. 18, 2021) <https://www.universal-rights.org/blog/the-french-case-of-the-century-ushers-in-new-era-of-environmental-litigation/>.

⁷⁵Harald J. Bolsinger, *Fundamental Rights in the Core Business of the ECB: No Issue?!*, in *THE EUROPEAN CENTRAL BANK AS A SUSTAINABLE ROLE MODEL. PHILOSOPHICAL, ETHICAL AND ECONOMIC PERSPECTIVES* 19–37, 21 (Harald Bolsinger, Johannes Hoffmann & Bernd Villhauer, 2020).

⁷⁶Charter of the Fundamental Rights of the European Union, 2012, O.J. (C 326) art. 2, 7 [hereinafter “UN Charter”].

⁷⁷*Id.* at art. 37.

⁷⁸HR 20 December 2019, NJ 2020, 14 m.nt J. Spier (Urgenda)(Neth), ¶¶. 6.1–7.3.6.

⁷⁹*Id.*

⁸⁰*Renewable Energy Sources and Climate Change Mitigation: Summary for Policymakers*, INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE (2011).

⁸¹The difference between the two types of obligations is close but so is the legal framework, see, *Keegan v. Ireland*, App. No. 16969/90, ¶ 49 (Dec. 9, 1994) <https://hudoc.echr.coe.int/eng?i=001-57881>; *López Ostra v. Spain*, App. No. 16798/90, ¶ 51 (Dec. 9, 1994) <https://hudoc.echr.coe.int/fre?i=002-10606>.

corresponding rights with the ECHR, interpretation of the EU Charter shall be the same, without preventing the EU Charter from offering a higher standard of protection.⁸² It is therefore likely that the CJEU would approach the right to life or the right to family life in the same fashion as the ECtHR. The case law given by the ECtHR can thus serve as guidance to the likely outcome of the CJEU. Two cases directly involve emissions and their effect upon the right to health and private life. The first is that of *Duarte Agostinho and Others v. Portugal and 32 Other States*. In this case, the plaintiffs argued a violation of their right to life, article 2, right to freedom from degrading treatment, article 3, right to private life, article 8, freedom from discrimination, article 14, and protection of property right, article 1.⁸³ Concretely, the plaintiffs' lives have been affected by the forest fires in Portugal which the plaintiffs argue is an effect of climate change. The plaintiffs further argue that the Member States are obliged to take more ambitious aims than a climate target of less than 1.5 degrees Celsius. They base their argument upon the precautionary principle—arguing that because the Paris Agreement is unclear on the exact level of burden sharing—that the respondents must take more ambitious action.⁸⁴ Unfortunately, this case is still pending, hence the case does not provide a legal framework yet. The second case that concerns emission reduction is that of *Verein Klima Seniorinnen Schweiz and Others v. Switzerland*.⁸⁵ Unfortunately, this case is also still pending and no legal framework can be taken from this case either.

The fair balance test will boil down to the economic importance of the digital euro will play in pursuing the ECB's primary mandate of price stability. According to the ECB report, the digital euro can serve as a viable alternative in case of a takeover of foreign currencies.⁸⁶ It is aimed to serve as a backup in case of cyberattacks or other reasons that endanger the current payment systems.⁸⁷ The opposing argument would be that the power consumption significantly increases the difficulty of meeting the renewable energy target. Failure to meet these criteria make it difficult to mitigate climate change. The effects of climate change are far greater and will affect more than two to three percent of the population and cannot be avoided. It will be difficult for the CJEU to adjudicate on such an issue. In the *Gauweiler* and *Weiss* case, the CJEU has refrained from an in-depth engagement with monetary economics.⁸⁸ The CJEU stated instead that the ECB was granted a wide margin of discretion when making technical decisions.⁸⁹ It is therefore unlikely that the CJEU will abolish this margin and engage with the advantages of monetary policy against climate change. Or that the CJEU will examine whether there are greener policy alternatives. There is, however, a shift in economic thinking concerning monetary policy.

Goldmann describes this new paradigm as “Integrative Liberalism”.⁹⁰ Under this new paradigm, context prevails over discipline and the importance of proportionality increases.⁹¹ Goldmann uses the PSPP judgement from the German Constitutional Court (BVerfG) as an example. In this judgement, the BVerfG focuses on the proportionality of the measure over the objective. Thus providing a more holistic approach to monetary policy.⁹² Applying a more holistic and context emphasized approach may favor climate concerns over the narrow

⁸²U. N. Charter, *supra* note 76, at art. 52(3).

⁸³*López Ostra v. Spain*, App. No. 16798/90, ¶ 51 (Dec. 9, 1994) <https://hudoc.echr.coe.int/fre?i=002-10606>.

⁸⁴*Duarte Agostinho v. Portugal*, App. No. 39371/20, annex ¶¶ 26–34 (Pending) (party submission available at: <http://climatecasechart.com/non-us-case/youth-for-climate-justice-v-austria-et-al/>).

⁸⁵*Verein Klima Seniorinnen Schweiz v. Switzerland*, App. No. 53600/20 (Apr. 2022) <https://hudoc.echr.coe.int/fre?i=002-13649>.

⁸⁶*Report on a Digital Euro*, *supra* note 12, at 11.

⁸⁷*Id.* 13

⁸⁸Case C-62/14, *Gauweiler v. Suetscher Bundestag*, ECLI:EU:C:2015:400 (June 16, 2015); Case C-493/17, *Wiess*, ECCLI:EU:C:2018:1000 (Dec. 11, 2018).

⁸⁹Case C-493/17, *Wiess*, ECCLI:EU:C:2018:1000 (Dec. 11, 2018).

⁹⁰Matthias Goldmann, *The European Economic Constitution after the PSPP Judgment: Towards Integrative Liberalism?*, 21 GERMAN L. J. 1058. (2020).

⁹¹*Id.*

⁹²*Id.* at 1075.

inflationary objectives. In particular, when there are alternative, less energy-intensive, mechanisms available. It is therefore likely that a fair balance test would promote the use of the least energy-intensive systems. Before this conclusion can be drawn there is, however, another factor that needs discussing.

IV. Undue Political Influence?

In the *OLAF* case, the CJEU considered that regulation can bind the ECB if it does not constitute a political influence. The previous paragraphs have demonstrated that there are good arguments to consider the ECB bound by the energy targets as part of their climate obligations. These obligations, however, may not form a political influence. What constitutes a political influence is, however, difficult to determine.

Independence and the lack of political influence is often related to credibility. If the financial market perceives the ECB to be open to political influence, it will be more difficult to control for inflation.⁹³ Therefore, if the energy targets were to be perceived as political influence, the ECB would have more difficulty controlling for inflation. It is arguable that if the Commission can mandate the ECB to comply with specific climate targets, this harms the ECB's credibility. It both raises the question whether the ECB can freely conduct monetary policy and what other targets the Commission can impose. However, one can also argue that the ECB already has recognised itself to be subject to the Paris Agreement. The reduction of energy is therefore merely a specification of how to achieve climate mitigation. To choose a less energy intense system, furthermore, does not hinder control of price stability. The theory of credibility has been criticized as well.⁹⁴ Posen argues that the credibility of the central bank is related to government's fiscal policy.⁹⁵ Thus aiming to mitigate climate change does not hinder the ECB's credibility, but rather may strengthen it. If the policies of the ECB undermine the political ambitions a rational consumer may expect the government to mitigate the affect of such a program. The easiest way for a government to achieve limitation of the digital euro's energy consumption is by decreasing its use. A conflict thereby arises between the national governments and the ECB. This conflict is potentially problematic. Baimbridge, Burkitt, and Whyman describe that all of the ECB's monetary decisions have political consequences. These include the availability of mortgages, living standards, and so more.⁹⁶ This, so they argue, is what causes the ECB's challenges in fulfilling their monetary mandate.⁹⁷ Therefore, there seems to be some benefit to allowing for the application of the energy targets.

There is one issue with applying the energy targets to the digital euro. The digital euro is a single policy in a wide spectrum of policy decisions taken by the ECB. Holding the digital euro to the energy reduction targets would be specific and aimed at a single policy. The Dutch Supreme Court faced a similar question in the *Urgenda* case. Whereby the Dutch Supreme Court had to examine to what extent a court can provide instructions to the government. The Dutch Supreme Court held that a court may not order the state to take a specific measure.⁹⁸ Such an order would interfere with the political independence of the government. The Dutch Supreme Court, however, considered that it was able to order the state to take measures to reach climate goals. As long as these orders were generic and the state was left with the freedom to choose what measures it would

⁹³Mark Baimbridge, Brian Burkitt & Phillip Whyman, *The Bank that rules Europe: The ECB and central bank independence*, (Burgess Grp. Paper No. 37, 2001).

⁹⁴*Id.*; Adam S. Posen, *Central Bank Independence and Disinflationary Credibility: A Missing Link?* 1 (Fed. Resv. Bank Of N.Y. Staff Reports, May 1, 1995).

⁹⁵*Id.* at 356.

⁹⁶MARK BAIMBRIDGE, JEFFREY HARROP & GEORGE PHILLIPPIDIS, *Central Bank Independence and Monetary Policy*, in CURRENT ECONOMIC ISSUES IN EU INTEGRATION 98 (2004).

⁹⁷*Id.*

⁹⁸HR 20 December 2019, NJ 2020, 14 m.nt J. Spier (*Urgenda*)(Neth.)¶ 8.2.4.

take.⁹⁹ Similarly, one could argue that the CJEU could not order the ECB to conduct specific policies. The complaints concerning human rights and climate change that were conducted in national courts involved a complaint about a level of government and their climate change policy.¹⁰⁰ These cases allowed the national courts to evaluate climate policies as a whole, including mitigation policies. Therefore, even though the ECB is bound by the Paris Agreement and to the EU Charter of Fundamental Rights, it is unlikely a case directed at the digital euro's energy requirements would be successful. These instructions would be too specific and constitute a political influence.

V. Reflections

The previous paragraphs have discussed the applicability of the energy targets in relation to the ECB's primary mandate. The energy targets are derived from the overall objective to mitigate climate change. The ECB has to abide by the climate change objective it is subject to under the Paris Agreement and climate change as a human right. The energy requirements, though formulated by the Commission, bind the ECB as these should not be considered an undue political influence.

Despite the applicability of the energy requirements, it is unlikely a specific policy such as the digital euro can be prohibited by these requirements. If a single policy could be evaluated in light of the energy objectives this should be considered an undue political influence. The ECB's climate objectives as a whole could be evaluated in light of these principles, but it is unlikely a single policy could. This means that other programs such as that of the asset purchasing could also not be evaluated in light of the principles. The evaluation of the ECB's climate program as a whole is difficult.

Based upon the classification of climate change as a human right it is most likely that the CJEU would conduct a fair balance test. This fair balance test would examine the interests of price stability, the ECB's primary mandate, against the importance of climate change. These are both important issues that have spillover effects into other areas of policy making. It has furthermore proven difficult for the CJEU to go in depth when reviewing technical policies. Due to previously granted margin of discretion it is unlikely that the CJEU would examine the individual policies in light of the climate goals. Because the digital euro cannot be reviewed against the energy targets the remaining question is whether the energy consumption can be reviewed under the secondary mandate.

D. The Primary and Secondary Mandate of the ECB

I. Place of the Secondary Mandate Within the Legal Framework

The mandate of the ECB is codified in article 127 Treaty on the Functioning of the European Union (TFEU). This article defines the primary mandate for the ECB as the pursuit of price stability. The previous paragraphs have concluded that it is unlikely for individual policies to be prohibited based on the ECB's climate obligations. However, for the digital euro to be lawfully introduced it has to abide by the ECB's mandate. Previous research has indicated that it is likely that a two-tier digital euro could be lawfully introduced based upon the ECB's monetary mandate.¹⁰¹ This conclusion, however, does not mean the ECB does not have any obligations to incorporate climate goals with regard to the design of the digital euro. These obligations flow forth from what is the ECB's secondary or economic mandate.

The secondary mandate of the ECB is phrased in article 127 of the TFEU as “[w]ithout prejudice to the objective of price stability, the ESCB shall support the general economic policies in the

⁹⁹*Id.* ¶ 8.2.6

¹⁰⁰See generally, note 74.

¹⁰¹Mooij, *supra* note 14.

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.”¹⁰² Article 3(3) Treaty on the European Union (TEU) includes the improvement of the quality of the environment. The secondary mandate, therefore, includes climate change mitigation. The question, however, remains as to what the legal status of the secondary mandate is. Whilst the primary mandate of the ECB has been further clarified in the euro-crisis case law, the exact interpretation of the secondary mandate raises discussion.

There are two suggested interpretations of the secondary mandate. The first interpretation of the secondary mandate is that of a stand alone mandate. Which provides the ECB with the legal mandate to pursue the economic objectives as long as it does not conflict with its primary mandate.¹⁰³ For the purpose of this article, the first interpretation is not relevant. This article assumes the ECB would introduce the digital euro under its primary mandate. Considering that the legal foundation would be the primary mandate, the question of whether it could pursue the digital euro under its secondary mandate is irrelevant.¹⁰⁴ Therefore this article will discuss the role of the secondary mandate when the ECB acts upon its primary mandate. The following paragraphs will therefore assess the relationship between the primary and secondary mandate. The second interpretation is that when the ECB has a policy choice with regard to achieving its primary mandate, the choice is guided by the secondary mandate.

The first question is under what part of the primary mandate will the ECB have to consider its secondary mandate. To answer this question the case law from the CJEU has to be examined. In order to establish the legality of both the Outright Monetary Transaction¹⁰⁵ and the Public Sector Purchasing Programme¹⁰⁶, the CJEU undertook three steps. The CJEU initially determined whether the policy was monetary in its objective. First, the CJEU established the objectives through examination of the policy’s aims and to a limited degree instruments and indirect effects.¹⁰⁷ Second, it examined proportionality.¹⁰⁸ Third, the CJEU examined whether the measure was not in violation of articles 123 and 125 TFEU.¹⁰⁹ The scope of the secondary mandate is not examined in the *Gauweiler* or *Weiss* case. To establish the objective of the policy the CJEU primarily examines whether the policy is monetary in aim.¹¹⁰ It is, therefore, unlikely that the secondary objective would be examined via the criterion of objectives. The CJEU in *Weiss* furthermore mentions that the economic mandate of the ECB demonstrates monetary and economic policy are not completely separated.¹¹¹ It is therefore likely that the CJEU would examine the economic policy as part of monetary policy, rather than create a different criterion or examine it as part of no-credit or no-bailout clauses. The proportionality review is, therefore, most likely to incorporate the review of the secondary mandate. However, the question is if the CJEU would be willing to review the ECB’s secondary mandate. In its euro-crisis case law, the CJEU conducted a limited level of review. In the CJEU’s judgements, the CJEU left a large amount of discretion to the ECB.¹¹² The *Weiss* case further confirmed an unwillingness of the CJEU to examine the effects of

¹⁰²Consolidated Versio of the Treaty on the Functioning of the European Union art. 127, May 9, 2008, 2008 O.J. (c 115) 47 [hereinafter TFEU].

¹⁰³I disagree with this theory for further discussion see Mooij *supra* note 14.

¹⁰⁴Furthermore it is unlikely a digital euro would be introduced under the ECB’s secondary mandate, see, Mooij, *supra* note 13.

¹⁰⁵This program was examined in the *Asset Purchase Programme*, *supra* note 37

¹⁰⁶This program was examined in Case C-62/14, Peter Gauweiler a.o. v. Deutscher Bundestag, ECLI: EU:C:2015:400 (June 16, 2015).]

¹⁰⁷*Asset Purchase Programme*, *supra* note 37, ¶ 52.

¹⁰⁸*Id.* ¶¶ 66–92

¹⁰⁹*Id.* ¶¶ 93–127

¹¹⁰*Id.* ¶ 46.

¹¹¹Case C-62/14, Peter Gauweiler a.o. v. Deutscher Bundestag, ¶ 60, ECLI: EU:C:2015:400 (June 16, 2015).

¹¹²Francesco Pennesi, *The Impossible Constitutional Reconciliation of the BVerfG and the ECJ in the OMT Case. A Legal Analysis of the First preliminary Referral of the BVerfG*, 8 PERSPECTIVES FEDERALISM 1, 14 (2016).

ECB policies.¹¹³ Whilst the balance of judicial review is difficult to find, both too strict and too lenient review is potentially harmful.¹¹⁴ The limited approach of the CJEU during the euro crisis emphasizes a strong level of independence for the ECB. It is therefore unlikely the CJEU would be willing to strictly examine whether the ECB has abided by its secondary mandate. Nevertheless, the ECB should abide by its mandate whether the CJEU will review it or not. Thus raising the question of how to interpret the secondary mandate. There are two different types of interpretation: A narrow and a more broad interpretation.

II. Narrow Interpretation of the Secondary Mandate

The first interpretation is very narrow, whereby economic objectives only refer to balanced economic growth. This interpretation would exclude other objectives such as environmental protection.¹¹⁵ Under this interpretation, the ECB would not have to consider the environmental impact of the digital euro. There is some evidence to be found in the Randzio-Plath-Maastricht-report for this interpretation. The report states “it [the ECB] will enjoy unprecedented powers which it can and must use both to fight inflation and to improve overall economic development.”¹¹⁶ Thus limiting itself to economic growth. The report further elaborates by stating “[i]t will be the ECB which decides whether to make central bank funds available and what interest rates should be payable on them, which in turn will have implications for economic growth, investment and employment.”¹¹⁷ In the report, there is a strong focus on the economy. Whilst this can be interpreted as an argument for a narrow interpretation of the secondary mandate it should not. The Maastricht-report examines growth and employment because these were the important concerns for monetary and economic policy at the time. The priorities develop over time, the environment was of lesser importance but has grown in importance since.¹¹⁸ Furthermore, article 127 of the TFEU refers to the objectives in Article 3 of the TEU. Article 3 of the TEU contains more objectives than “balanced economic growth.” Article 127 of the TFEU specifically points to objectives plural, not to a single objective. From a legal certainty perspective, the question is how to define “balanced economic growth.” The goals listed in article 3 of the TEU can be considered the specification of balanced economic growth. Considering these arguments it is unlikely that a narrow interpretation of the secondary mandate should be followed. Ioannidis and others, therefore, argue for a broader interpretation.

III. Broad interpretation

The second and broader interpretation entails two aspects. The first is the positive obligation of the ECB to support EU policies. The second is that the primary mandate may not undermine EU policy.¹¹⁹ In practice, that means the ECB would have to apply its secondary mandate when there is a choice between equally effective policies.¹²⁰ Elderson, a board member of the ECB, considers that the word “shall” in article 127 of the TFEU means there is an obligation for the ECB to

¹¹³Marijn Van Der Sluis, *Similar, Therefore Different: Judicial Review of Another Unconventional Monetary Policy in Weiss (C-493/17)*, 46 LEGAL ISSUES OF ECON. INTEGRATION 263 (2019).

¹¹⁴Matthias Goldmann, *Adjudicating Economics? Central Bank Independence and the Appropriate Standard of Judicial Review*, 15 GERMAN L. J. 265, 268 (2014).

¹¹⁵Michael Ioannidis, et al., *supra* note 69, at 13.

¹¹⁶Randzio-Plath, C. (1998) Democratic Accountability in the 3rd phase of EMU. European Parliament Report.

¹¹⁷*Id.*

¹¹⁸J. Deyris & T. Bonnet, *From Words to Deeds? Climate Change and the European Central Bank* 6 (Char Energy & Prosperity Working Paper, Sept. 28, 2021).

¹¹⁹Michael Ioannidis, et al., *supra* note 69, at 14–15.

¹²⁰*Id.*

prioritize policies that comply with the secondary mandate.¹²¹ This interpretation has a clear impact upon the ECB's discretion to choose between various systems of the digital euro. Considering that improving the environment is an objective vested within the secondary mandate of the ECB, the ECB would have to choose the least energy consumptive operating system for the digital euro. Unfortunately, it is more complicated. When following the interpretation of Elderson the first question that needs to be raised is whether there are multiple policies that would equally achieve the ECB's primary goal.

The first option concerning a less energy consumptive system is the increased use of cash payments. Whilst less energy-intensive, cash has different climate issues.¹²² Furthermore, the report on the digital euro states that the introduction is partly to support the technological development of the European economy and to provide an alternative in the decline of cash.¹²³ Considering the overall decline of cash pre-digital euro and the increasing international payments, it is unlikely the use of cash is a serious alternative. In general, it is unlikely the introduction of a system other than a digital euro is a viable alternative. Therefore, it is unlikely the ECB would be able to maintain price stability without a digital euro. The policy choices it then has to consider is whether it will opt for a digital euro, based upon a centralized system or a blockchain.

The previous paragraphs have demonstrated that a system based upon PoW blockchain is by far the most energy-intensive. The difference between a public PoW and a simple server system is a factor of 10^{11} .¹²⁴ Thus generating an easy policy choice for the ECB, the ECB would have to choose for a system based upon a server. Again, it is not this simple for two reasons.

First, one would have to assume that both systems can equally achieve the primary goal. This assumption is not *per se* a given. Second, the ECB report on a digital euro responds to five core central bank functions.¹²⁵ These functions are: First, to improve the EU digital economy; second, to provide an alternative to cash; third, compete with private currency; fourth, to transmit monetary policy; and, fifth, to provide a system resilient to extreme weather and cyber threats.¹²⁶ A centralized system can provide an alternative to cash and transmit monetary incentives. A digital euro would not have to function very differently from the current banking system in order to achieve these goals. However, a digital euro would need different design features to achieve safety and compete with private currencies.

A centralized system, as the name implies, is run through a centralized and usually single authority. It can, therefore, be more prone to security attacks and failure. If the single processor is hacked or fails for other reasons, the system is out. A decentralized system spreads this risk through the use of decentralized nodes. Whilst generally considered safer the safety of decentralized systems is not absolute either. To control a PoW-system one needs to control fifty-one percent of the mining facilities. To control a PoS-system one needs to control fifty-one percent or more of the total value of the currency. The PoS-system is thus generally considered safer than a PoW-system. Houy, however, argues that a PoS-system is not immune against the fifty-one percent attack.¹²⁷ In his article, Houy describes that a credible agent willing to undermine the system causes the validators to anticipate the loss of value of their coin. Thus, Houy, argues the fifty-one percent attack when executed by a credible agent would not only be possible but would not even have to be very expensive.¹²⁸ The security of a decentralized system is therefore debatable.

¹²¹The ECB Podcast, *Tackling Climate Change as a Central Bank: Between Motivation, Obligation and Limitation* (May 12, 2021) https://www.ecb.europa.eu/press/tvservices/podcast/html/ecb.pod210512_episode16.en.html.

¹²²See, Arnold, *supra* note 15.

¹²³*Report on the Digital Euro*, *supra* note 12 at 9.

¹²⁴Arnold, *supra* note 15, 606.

¹²⁵The Statute of the European System of the Central Bank, *supra* note 10, ¶¶ 9-14.

¹²⁶*Id.*

¹²⁷Nicolas Houy, *It Will Cost You Nothing to 'Kill' a Proof-of-Stake Crypto-Currency* 1 (Gate Working Paper No. 1404, 2014).

¹²⁸*Id.* at 4.

Similarly, improving digital enhancement that can compete with private currencies and serve as a backup system is challenging. The ECB report states that the digital euro should have functionalities similar to those of private currencies.¹²⁹ One of the attractive features of private currencies based upon blockchains is the transaction speed. A currency based upon blockchain can transfer currencies within a very limited time span. The fastest cryptocurrency transaction takes roughly three to five seconds.¹³⁰ Within this time the currency can be transferred anywhere on the globe. The international transaction time through a ledger takes longer, depending on the operating hours and times of the bank(s) involved. Sun, Mao, Bai, and Chen's experiment indicates that a CBDC based on a blockchain can reach inter-blockchain transaction speeds approximately three times faster than via central bank reserves.¹³¹ A ledger system may therefore not be considered to have the same features as a private currency. It is therefore questionable whether a ledger-based digital euro could compete with virtual currencies. Thus raising the question of whether it is as effective as a ledger-based digital euro to achieve the monetary aim. If transaction time is considered an important feature, the ledger-based digital euro could not prevent an influx of private currencies. According to Elderson's interpretation of the secondary mandate, if a ledger technology would not achieve the primary goal equal to a blockchain-based digital euro, the ECB would be free to choose a decentralized digital euro. The CJEU furthermore allowed the ECB discretion when making technical decisions.¹³² It is, therefore, likely that the ECB would successfully be able to argue why a decentralized approach is the most effective policy to achieve their monetary objectives. If there is a most effective policy the ECB would not have to consider their secondary objectives.

Additionally, when interpreting the secondary mandate as guiding for a policy choice, there is the problem of hierarchy. If the ECB can choose between policies it must act in accordance with its secondary objectives.¹³³ Article 3 of the TEU, however, lists a broad scope of objectives that can conflict with each other. For example, the objectives include technical advancement and full employment. Technology can take jobs away from workers. A study in the U.S. indicated that one additional robot per 1000 people, would decrease employment by 0.2%.¹³⁴ Whilst some suggested there should be a ranking of secondary objectives,¹³⁵ to date such a ranking has not yet occurred. Choosing which objective to follow is largely a political choice. The ECB should not—have to—make such political decisions. Lastra and Alexander argue that because the secondary mandate is generic it is, therefore, difficult to hold the ECB to account.¹³⁶ Providing more ground as to the difficulty for the ECB using this mandate and why it is undesirable for the ECB to be making such choices. Furthermore, because of the generic nature of the secondary objectives, it is easy to argue that all policies contribute to at least one of these objectives.¹³⁷ Using Elderson's definition of the ECB's secondary mandate, therefore, provides limited restrictions upon the

¹²⁹*Id.* at 12

¹³⁰Which Cryptocurrency Has the Fastest Transaction Time, CRYPTIMI (Nov., 2021) ~<https://www.cryptimi.com/guides/fastest-cryptocurrency#:~:text=Stellar%20Lumens%20%E2%80%93%20This%20is%20an,finality%20time%20of%204%20seconds>.

¹³¹He Sun, Hongliang Mao, Xiaomin Bai & Zhidong Chen, *Multi-Blockchain Model for Central Bank Digital Currency?* 2367 (PDCAT Conference Paper, 2017).

¹³²*Asset Purchase Programme*, *supra* note 37, ¶ 68; The ECB Podcast, *supra* note 121.

¹³³Nick de Boer & Jens van't Klooster, *The ECB's Neglected Secondary Mandate: An Inter-institutional Solution*. POSITIVE MONEY 10 (Oct. 2021) http://www.positivemoney.eu/wp-content/uploads/2021/10/The-ECBs-neglected-secondary-mandate_v6.0.pdf.

¹³⁴Daron Acemoglu, Pascual Restrepo, *Robots and Jobs: Evidence from US Labor Markets*, 128 J. OF POL. ECON. 2188 (2020).

¹³⁵Grégory Claeys, Pervenche Bérés, Stanislas Jourdan, Nik de Boer, Panicos Demitreades, Sebastian Diessner, Vivien Schmidt & Jens van't Klooster, *The ECB needs political guidance on secondary objectives*, BRUEGEL (Apr. 22, 2021), <https://www.bruegel.org/comment/ecb-needs-political-guidance-secondary-objectives> (accessed 08 November 2021).

¹³⁶Rosa M. Lastra & Kern Alexander, *The ECB Mandate: Perspectives on Sustainability and Solidarity* 12 (Monetary Dialogue Papers 2020).

¹³⁷Acemoglu, et al., *supra* note 134, at 11.

ECB. This conclusion, however, seems to be too easy. In the report published by Positive Money, De Boer and Kloosterhuis argue that the secondary mandate of the ECB is as important as the primary mandate. To ignore the secondary mandate, they argue, would be illegal.¹³⁸ This is supported by the arguments of Solano, mentioned in the previous paragraphs, concerning article 11 of the TFEU. Which requires the incorporation of environmental protection into EU policy.¹³⁹ It, therefore, seems that whilst the ECB has some discretion in its decision making it will have to explain the impact of its actions upon the secondary objectives.

IV. Reflections

The secondary mandate of the ECB should not be interpreted as equal to the primary mandate. It binds the ECB when it has a choice between different strategies to achieve its primary mandate. This element of choice creates a difficulty with regard to the asset purchasing programs. The ECB states that there are not enough green bonds to achieve their primary objective. Assuming the ECB is, indeed, correct, then there are no two policies that would achieve the same end. If there are not enough green bonds, there are no alternative approaches for the ECB to reach its primary objective. It would therefore eliminate the needed choice in primary objectives. With regard to the Asset Purchasing Programme there is another difficulty.

The German Constitutional Court in its response to *Weiss* considered that the ECB had not considered the impact of its program on other parts of the economy.¹⁴⁰ This consideration could be classified as a reference to the ECB's secondary mandate. As discussed in the previous paragraphs there is, however, no list of priorities within the secondary mandate. Therefore the ECB's choice should either be between obviously harmful for a balanced growth or obviously good. The policy choice of the ECB might benefit climate but harm economic growth or *vice versa*. This question is particularly important because it is questionable what circumstances lead to a mitigation of emissions and thereby climate change. High energy use is but one of the concerns. A sector can have a low energy usage but a high amount of emissions. Furthermore, green quantitative easing (QE) is not *per se* a given to contribute to the mitigation of climate change. The research conducted by Ferarri and Landi indicates that depending on the economic circumstance green QE can increase emissions. Their research argues that when the green and brown goods are complements, green QE can increase overall pollution.¹⁴¹ These difficulties arguably increases the technical considerations involved. Considering the decision involves both a technical consideration and a potential trade-off between various objectives, it is unlikely the CJEU would apply a strict level of judicial review.

The CJEU examined the ECB's economic assessment of the euro-area by examining whether the ECB has made a manifest error.¹⁴² Without further regulations guiding the ECB in its implementation of secondary mandates, it is likely the CJEU would use the manifest error criterion for the secondary mandate as well. It will be difficult for a plaintiff to argue that the ECB has made such a manifest error within its purchasing strategy. Partially because what assets are bought depends on the developments of the financial markets and partially because it is likely the ECB would not make a manifest error. Unless the ECB decides not to purchase green bonds without explanation it is unlikely the ECB would be judged to have made a manifest error. This is different, however, for the digital euro because there are clear calculations of the required energy that can be made in advance.

¹³⁸*Id.* at 10

¹³⁹See Solana, *supra* note 1.

¹⁴⁰BVerfG, 2 BvR 858/15, May 5, 2020, ¶¶ 1–237, 133 https://www.bundesverfassungsgericht.de/SharedDocs/Entscheidungen/EN/2020/05/rs20200505_2bvr085915en.html.

¹⁴¹Alessandro Ferrari & Valerio Nispi Landi, *Toward a Green Economy: The Role of Central Bank's Asset Purchases* 26 (Bank of Italy Temi di Discussione Working Paper No. 1358, Feb. 2022)

¹⁴²Case C-62/14, *Gaulweiler v. Suetscher Bundestag*, ¶ 74, ECLI:EU:C:2015:400 (June 16, 2015).

Regarding the introduction of the digital euro, the ECB will have some discretion in choosing what design form it will use. The secondary mandate does not *per se* prohibit the use of a (partially) decentralized system. However, the ECB will have to explain why it decided on a certain system above others. Whereby, it will have to demonstrate how it affects energy consumption. In particular, if the ECB chooses the most energy consumptive system, it will have to explain why other blockchain-based systems would not suffice. It can base its decision on the primary mandate but the ECB will have to demonstrate that the less energy intensive designs do not reach their primary mandate. As established before the main difference between the designs is speed. The centralized system might be somewhat slower than a decentralized design. A centralized system or combined system can reach efficient transactions speeds for trade. It therefore indicates that there is a real choice between two policies that can equally achieve the primary mandate. The ECB will therefore have to be guided by the secondary mandate. The difficulty with the secondary mandate is often the trade-off. This trade-off is, however, limited with the digital euro. The digital euro is not associated with other forms of pollution. Only the mining might be used as a social policy whereby mining rights can be allocated to lesser developed EU economies. However, there are serious risks with attracting miners outside ECB control. It is therefore not considered a serious option to use a mining system whereby miners are outside the ECB's direct sphere of influence. It is therefore difficult to imagine how the ECB can explain an energy intensive digital euro. Nevertheless, it would also require a change in the level of review conducted by the CJEU. The CJEU has not yet examined the secondary mandate of the ECB. Whilst it was mentioned in the *Gauweiler* case¹⁴³ it was not reviewed in relation to the ECB's primary mandate. It is therefore difficult to predict whether the CJEU will do so in future cases. Whilst Goldman recognizes an Integrative Liberalism approach in the PSCP judgement.¹⁴⁴

E. Conclusion

This article has examined the design of the digital euro in light of the climate obligations of the ECB and compared this with the impact upon the asset purchasing program. It has first discussed the different operating designs that are possible. There are two types of operating systems that could be used: A centralized ledger system and a decentralized blockchain system. The blockchain system has the potential to require large amounts of energy. This article then evaluated whether the ECB was free to introduce a system that require such large amounts of energy.

The article first examined the obligations in addition to its primary mandate. This article concludes that whilst the ECB is subject to the Paris Agreement this treaty does not make specific reference to the renewable energy targets. The energy targets are defined by the Commission and aimed at the Member States. There are arguments to consider the ECB nevertheless bound by these targets and therefore must consider them. It would, however, harm the independence of the ECB if specific policies were analyzed, rather than the general policy of the ECB as a whole. This article therefore continued by examining the obligations under the secondary mandate of the ECB.

With regard to the secondary mandate of the ECB this article concludes that there are various interpretations possible. It is, however, most likely that the secondary mandate should be applied as a framework towards proportionality. Whereby the question should be asked are there multiple ways to achieve the same monetary objective? And if so, which policy best supports the secondary objectives laid down in article 3 of the TEU? In order for the ECB to lawfully introduce a blockchain-based digital euro, it would therefore have to take two steps. First, it would have to prove a centralized ledger system would not achieve the same monetary objectives. If the ECB can demonstrate the need for a blockchain-based digital euro it would then have to choose between the

¹⁴³Asset Purchase Programme, *supra* note 37.

¹⁴⁴Goldman, *supra* note 90.

different types of blockchain. The ECB would thus have to provide arguments why the blockchain they choose best supports the monetary aim. If, however, there is a choice between various blockchain systems the ECB will have to explain why their proposed design best supports the objectives laid down in article 3 TEU. The framework of the secondary mandate towards the asset purchasing program is a little more complex. Whilst the digital euro has very clear design choices, asset purchasing programs are more complex in their design. These programs have various trade-off effects and can be counterproductive, depending on the economic circumstances. It is therefore more likely that the CJEU will conduct a limited level of judicial review and grant the ECB a wider margin of discretion.