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REGULATION AND
ECONOMIC DEVELOPMENT

Economic Regulation for Green Hydrogen: Weighing-up alternatives

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1. Introduction

Economic regulation is necessary to restrain the abuse of market power by firms which control natural monopolies in key infrastructure such as transmission grids, ports and railway networks. These were generally built by the state because private firms will under-invest relative to the economy-wide returns. State-funding is necessary given the extensive positive spill-overs from, for example, an electricity grid connecting the country. Regulation can ensure access to, and pricing of, essential infrastructure, key inputs, and bottleneck goods and services that cannot be easily replicated. It is necessary to ensure that fair access is provided and that monopoly prices are not charged (Viscusi et al., 2005). Regulation and government policy measures are also necessary where there are large positive and negative externality effects such that prices do not appropriately value goods and services.

Realising the enormous potential of green hydrogen poses fundamental challenges to economic regulation designed to address control over existing infrastructure. Green hydrogen investments are for a new alternative energy source, motivated by the large *global* externalities generated from going green. While the overall objective is to decarbonise the global economy, in the South African context green hydrogen enables heavy industries across the economy to pivot to green production.¹ It is essential that this is at relatively low-cost compared to international benchmarks. When international rules mean that the steel, chemicals and cement industries will be green, where will South African producers be on the cost curve?

Regulating for green hydrogen is a complex challenge as it requires enabling linked investments in renewable energy generation, transmission to green hydrogen production, and in the storage and transport of the hydrogen to customers. These involve dynamic changes to develop a whole new set of industries. Dynamic considerations such as the impact on investment decisions, the impact of infrastructure on the development path of the economy, and the creative role of competitive rivalry all need to be part of an effective economic regulatory regime. Such a regime may have very light regulation where investments in new facilities are being made to allow the investors to capture all of the possible returns, at least in the short to medium term and subject to the Competition Act.

However, we cannot do away with a rules-based regulatory framework. Rules are essential so that investors know what to expect. There are also critical bottlenecks which if controlled by powerful interests will undermine the broad-based investment and growth required. We therefore need regulation *for* investment and *for* competitive rivalry where-ever possible to allow for different approaches and business models to spur innovation and learning. A regulatory regime that favours incumbents over new entry will fail to realise the dynamic gains from greater competitive rivalry.

It is clear that regulatory record in South Africa has been especially poor when we consider the incentivisation of new and efficient investment in energy (see Goga, 2023, in paper 1; Das Nair and Roberts, 2017). Generally entrenched interests have frustrated investments in expanded infrastructure that would have otherwise increased participation in line with government's economic and social objectives.

¹ DTIC, Green Hydrogen Commercialisation Strategy for South Africa, 30 November 2022, available at <http://www.thedtic.gov.za/wp-content/uploads/Full-Report-Green-Hydrogen-Commercialisation-Strategy.pdf>

For the reform of the regulatory regime to be fit for purpose in enabling rather than hindering transformative investments in green energy we compare and contrast three scenarios:

1. Status quo
2. A reformed NERSA
3. A competition led regime

We consider these scenarios against core principles which government can commit to as soon as possible. These principles are as follows.

- The regulatory regime should be independent and transparent, minimizing the need for discretion.
- The regime should be reviewed and adapted on a regular basis, in an iterative test-and-learn approach which strikes a balance between setting out the roadmap for the regulatory regime for investor certainty and flexibility in implementation given the rapidly changing context.
- The authority must be able to 'see', in other words, to obtain all necessary data. This requires powers and capabilities.
- The authority must be able to make and enforce effective decisions timeously. This cannot be through lengthy legal proceedings, given the need to resolve matters to allow market participants to make decisions.

2. Scenario 1: the status quo and what this means for green hydrogen?

2.1. The status quo

The current regulatory regime for the energy sector is inconsistent, unpredictable, and not transparent from an economic regulation perspective (see Goga, 2023, paper 1). This creates uncertainty for investors and customers, including new investors and their potential customers for green hydrogen. Green hydrogen relies on critical regulated inputs including the electricity grid through which renewable energy is transmitted. Storage facilities and pipelines will also be important for green hydrogen. Green hydrogen is also linked to the ammonia and the regulated natural gas value chains more broadly.

Furthermore, energy regulation in South Africa is both fragmented and inefficient in various ways. It involves capacity planning at Ministerial level, while regulation over licensing (therefore entry), pricing, and competition (in terms of third-party access) falls under the responsibility of NERSA as an independent regulator, with the competition authorities also responsible for policing anti-competitive conduct. Regulation in the sector is governed by three different Acts, namely electricity, gas, and petroleum pipelines. While the details of the challenges in the regulatory framework are laid out in more detail in Paper 1 (Goga, 2023), it suffices to say that the existing regulatory framework has not enabled investment and growth of the energy infrastructure in South Africa.

The electricity sector has suffered greatly from inadequate expansion and high prices. These have resulted from a combination of factors including wasteful and corrupt expenditure at Eskom, limited and stilted decision-making over new generation (as a result of policy delays)

and the fact that prices for electricity that were applied for were not approved by the regulator, leading to financial constraints for Eskom given the divergence between costs and prices.² While some restriction of price increases may be justified given Eskom's record of corruption and wasteful expenditure, the regulatory framework has also failed to incentivise investment to meet the needs of the economy and to ensure proper maintenance of the grid to ensure stable supply.

Policy has been dysfunctional at a practical level too. For example, at municipal level, delays in the implementation of policies aimed at restructuring municipal electricity distributors to form larger regional electricity distributors never occurred, resulting in legislation such as pricing policies that were written for regional electricity distributors applying instead to small and sometimes under-capacitated municipalities. This has left the regulator implementing some pricing policies that do not bear relevance to the existing market structure. Additionally, the regulator itself has failed to insist on compliance with the pricing policies set. For example, where cost of supply studies were required for large municipalities, this was not insisted on. This has resulted in numerous Court challenges to approved prices (using benchmarking methodologies not envisioned by policy) which further adds to instability in pricing.³ A combination of these issues has meant an inadequate supply of electricity and subsequent rolling blackouts together with price spikes which have had serious consequences for businesses and households in the economy that depend on electricity.

Similarly, in terms of the gas sector, regulation of the price of gas and transmission has led to substantial variability in the price of gas to large industrial customers. While the behaviour of the regulator was technically consistent with the regulatory framework, their early decisions led to price spikes for some customers. This has created uncertainty and unpredictability for the customers and the regulated entity, as prices were contested legally and overturned during protracted litigation.⁴ Furthermore, this has taken place in the context of scarcity in piped gas supply with limitations in the volumes expected at existing gas fields in Mozambique.⁵ Further lack of planning at ministerial level has meant that infrastructure and planning required to secure alternative supply to these customers through developing LNG terminals at ports has not been forthcoming. This has not allowed for the subsequent investments required in pipeline infrastructure, for example, and has left industry with a high level of uncertainty as to their energy supply for the future. In petroleum pipelines and storage there has also been contestation over the tariff approval for investments made, and onerous licensing requirements.

2.2. Investment incentives for green hydrogen

Overall, the existing regulatory environment has **not been conducive to investment historically** and, unless addressed, this will continue to have **negative implications for the development of green hydrogen**.

Firstly, there has been a **slow pace and uncertainty over key decisions**. For example, delays in the introduction of sufficient new renewable generation (through delays in the

² See, for example, see Crompton and Matsika (2021)

³ Casting Forging and Machining Cluster of South Africa and others v National Energy Regulator of South Africa and others, (92792/2019) [2022].

Nelson Mandela Bay Business Chamber and Others v National Energy Regulator of South Africa and Others (63393/2021)[2022]

⁴ National Energy Regulator of South Africa and Another v PG Group (Pty) Limited and Others 2019 ZACC 28

⁵ IGUA SA (2021), IGUA SA Annual Report 2021, Available [here](#)

development and implementation of integrated resource plans at Ministerial level, delays in licensing and contracting for REIPPs and self-supply including through blocking by Eskom as a vertically integrated entity). A similar pattern has occurred in gas where there were significant delays in the publication of a Gas Master Plan (which was published in 2021 but did not contain concrete plans and timelines). Furthermore, insufficient Ministerial direction on LNG terminals has delayed investment downstream in pipelines.⁶ Similar policy paralysis may hinder the development of the nascent green hydrogen industry.

Secondly, **delays in structural reforms** mean that it is difficult to plan ahead without understanding what the market will look like going forward and what the likely terms will be. These include the separation of the grid from Eskom's generation business.

Thirdly, **pricing uncertainty** due to the legal contestation and overturning of several key decisions made by the regulator across sectors is likely to lead to uncertainty over the financial projections and modelling and leads to additional risk for investment.

The impact of the existing regulatory framework in energy (including electricity, gas and petroleum pipelines and storage) has a significant impact on investment incentives for green hydrogen. Given the likely uncertainty in prices of inputs and final products going forward (based on historical patterns of decisions being taken on review), this adds to the risk of investments and therefore to the cost of capital. It is likely compounded by barriers to investment and expansion in terms of the licensing framework and a lack of certainty over the role of regulation in terms of accommodating entry and protecting competition (for example, in terms of providing access to infrastructure). As such, the status quo is not conducive to the development of the industry.

In this context, the risks associated with building large infrastructure (such as pipelines) are heightened. As a result, the development of green hydrogen for export or own-use on site may be preferred by investors over green hydrogen for use within South Africa, for example by piping it to industry, which may require additional regulatory interactions and rely on policy direction. Furthermore, difficulties in the electricity sector make it risky for an investor to invest in a manner that requires or leads to integration with the grid.

2.3. Competition and existing dominance

In a green hydrogen transition **strong competition will be important to spur innovation and reduce costs** along the value chain. This will be important both for inputs such as renewable energy and outputs such as the sales of hydrogen and hydrogen-based products to customers. The current regulatory framework has not played a sufficiently strong role in allowing for interconnection and third-party access. This has been most apparent in electricity where entry by renewable providers has been stymied by the legal framework and the choices made by Eskom as a vertically integrated dominant provider. In particular, Eskom's decision not to sign contracts with renewable providers as part of the REIPPP has had pervasive consequences for energy supply. Furthermore, the current framework has not incentivized entry.

Going forward it is unclear if providers that seek access to infrastructure held by existing dominant players (for example, the electricity grid from Eskom, or pipelines from Transnet) can depend on the regulatory authorities to support their requests for access at a fair price. The historical behaviour patterns and continued strength of the dominant energy entities Eskom, Sasol and Transnet, all of which would feed into, provide infrastructure for or compete in a green hydrogen economy suggest that this would also entail some risk.

⁶ IGUA (2022), Interim Report.

2.4. Spillovers and innovation effects

The current framework does not account for the externalities and benefits that will arise in the economy from stable and secure alternative energy supply and the development of new industries, particularly ones that can build complementary and downstream industries. As such, the benefits are likely to be undervalued in regulatory decision-making.

It is necessary to consider **where green hydrogen as a product fits in within the regulatory framework**. At present it is covered in liquid form for the purpose of pipelines. It is covered in terms of the Gas Act if it is used to enrich natural gas, and it will require licensing for storage and distribution under the Petroleum Pipelines Act. Adaptation of the legal framework to create clarity over the regulatory requirements for green hydrogen, as a product, is necessary. For example, would the Gas Act need to be amended to incorporate green hydrogen? Alternately would it need to be carved out? The EU is currently engaging in adapting their framework through legislative proposals including new regulation on EU gas and hydrogen markets, a directive on EU gas and hydrogen markets and regulation to reduce emissions. The legislative proposal made by the European Commission in December 2021 was still under consideration by the parliament at the time of writing. It is likely to extend the natural gas legislation to encompass hydrogen markets. This would mean hydrogen is subject to similar rules as natural gas including a market-based focus which incorporates a competitive framework with rules on, for example, third party access, customer rights and the unbundling of transmission operators.⁷

3. Scenario 2: NERSA Reformed: A reformed energy regulatory regime fit for purpose

3.1. A reformed regime

The second scenario we consider is to reform the existing energy regulatory framework to integrate it in anticipation of the large investments for green hydrogen and to cover an energy sector that is more diverse and more competitive than it is currently. The regulatory framework needs to be adapted from one focused on the regulation of natural monopolies to one that promotes competition.

There are important changes already underway. The implementation of the multi-market model for the electricity sector means that there is going to be a much wider set of competing electricity generators offering dynamic prices that may not need as much tariff regulation, but rather the regulator monitoring the market and establishing rules for its effective functioning. The pipelines sector may need to be more permissive of a range of competing gas and petroleum pipeline facilities rather than the current monopolies run mainly by Transnet and Sasol. Petroleum storage facilities can likely be *deregulated* in many cases where there are alternatives available.

The legislation covering each of these areas is currently quite different and has anomalies which need to be addressed. For instance, while NERSA *may* set tariffs for electricity licensees at its discretion, it *must* set tariffs for all petroleum pipeline and storage facilities regardless of whether regulation is needed or not. While there is a competition test prior to the regulation of natural gas molecules, there is very little prior analysis before the

⁷ European Parliament, Briefing on EU Directive on gas and Hydrogen Networks, March 2022 [https://www.europarl.europa.eu/RegData/etudes/BRIE/2022/729303/EPRS_BRI\(2022\)729303_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/BRIE/2022/729303/EPRS_BRI(2022)729303_EN.pdf)

mandatory setting of tariffs for all of the hundreds of petroleum storage facilities across South Africa, nor is there a competition test for setting electricity tariffs.

If we are to reform the current regulatory regime to respond to the changes underway and reduce uncertainty for investors, we suggest three areas for reform: (i) converge the energy legislation in South Africa to better cover diverse suppliers, entry and competition; (ii) strengthen the regulator from an institutional and operational perspective; and, (iii) introduce improved dispute resolution processes to reduce the uncertainty arising from lengthy delays in decisions and subsequent litigation.

3.2. Converging the legislation: Market assessments, structural remedies and pricing remedies

In the first step, we suggest that a framework be developed for a consolidated energy law or framework for South Africa that regulates all energy-related activities, including green hydrogen. Rather than specifically regulating infrastructure on a piecemeal basis, a converged law would provide for a set of guiding principles that the energy regulator takes into account when (i) determining whether to intervene or not, and (ii) deciding on an intervention such as price regulation or structural separation. A broad guiding principle is that competition should be encouraged wherever a service can be offered on a competitive basis. In general, licences in such a framework would not be necessary, and rather a permissive notification and registration framework would be introduced⁸, with general obligations on licensees to comply with various regulations and guidelines issued by the regulator. The key aspects of this are as follows:

3.2.1. Competition framework for deciding whether to intervene or not

A converged law or framework might refer to the Competition Act for principles applicable to determining whether a firm is dominant, the first screen to assessing whether intervention is necessary. A theory of harm might then be identified, perhaps again referring to the Competition Act, in respect of sections 5, 8, and 9 which relate to vertical agreements that might harm competition, abuses of dominance, and price discrimination.

It is important that interventions only be made in circumstances where there is clear evidence of market failure, emphasizing the regulation of natural monopolies such as electricity distribution grids, or long-distance high-volume petroleum and natural gas pipelines. Where regulatory action is required, the regulator must have the powers to investigate, make and enforce decisions timeously.

Where there are less likely to be concerns about entrenched market power, such as, where there are many competing independent power producers, or a large number of green hydrogen providers, then the regulator plays a role of market surveillance. Where there are sectors, such as certain categories of petroleum storage facilities, for example, that are currently regulated but need not be, then a transition to de-regulation needs to be

⁸ For example, the ERA currently has different categories of licence, including generation and trading licences. This was designed with a monopoly electricity utility in mind. In a multi-market model, there is no need for licences to generate electricity. South Africa should move towards a general authorisation framework, in which the regulator is notified of new facilities, and generators wishing to participate in the day-ahead, capacity, ancillary services or any other market will need to comply with codes governing those markets, and will be penalised or disconnected if they do not comply. There is no need, in these circumstances for an additional licence. Similar to generation, any entity wishing to set up an electricity trading business should not need a licence, but should rather notify NERSA and comply with any market and grid codes that are established by the TSO and approved by NERSA. There is no need for a separate trading licence.

considered. The market-watching role can address market failures to do with information asymmetries.

The new framework should empower the regulator to collect and publish data on a regular basis, including for competition screening decisions. There should be a provision in the legislation committing to open data standards.⁹ The regulator may then make a determination whether any markets require regulation, and set up ex-ante regulations for any such market, reviewing these periodically.

When taking such decisions, the regulator should be permitted to prioritise markets for analysis and intervention. Small businesses, for example, as defined in the Small Business Act and regulations, might be exempt from onerous regulatory requirements. A further important principle is that regulation of markets at the wholesale level is preferred to the regulation of retail tariffs, where competition is possible.

For example, electricity distribution infrastructure (wholesale) markets are often identified as requiring to ex-ante regulation, due to their natural monopoly characteristics. In the absence of regulation, it is likely that such infrastructure owners will also seek to prevent competition at the retail level, in respect of the sale of electricity to end users. In this case, there will be less competition for buying generation capacity through the proposed market as there will be fewer retailers, and consumer interests will also be harmed as there will be less choice, less innovation, and higher prices. The wholesale infrastructure market might therefore be identified as susceptible to ex-ante regulation, while the retail markets for supply to end users will be unregulated and left to competing providers to set tariffs to end users. This would depend on a detailed analysis of specific geographies, as there may be residual market power even at the retail level in specific geographies.

There may be other market failures beyond the exertion of market power that may require regulator or government interventions, and a new energy framework should provide for this. For instance, a new energy regulatory framework might empower the energy regulator to take into account externalities, including environmental externalities of different kinds of energy production, such as the harmful impact of carbon emissions. In this regard, consideration might be given to having carbon taxes managed by the energy regulator.

Furthermore, in the event that markets fail to give rise to investments in critical infrastructure, such as the supply of transmission grids in regions most suitable for renewable energy production or suitable for regional diversity in renewable energy, the regulator or the government might be empowered to subsidise such infrastructure. Similarly, the government may be empowered to subsidise the supply of electricity infrastructure in rural areas.

Principles for key remedies

In respect of markets susceptible to ex-ante regulation, some of the key remedies include ordering that access to key inputs be provided, setting prices to customers, and vertical separation of a vertically integrated firm. Legislative inconsistencies in the application of remedies, such as regulating the wholesale supply of natural gas molecules but not the tariffs for natural gas distribution, would be eliminated in the new framework. Similarly, constitutional provisions that confer monopoly power on local municipalities, such as their ability to surcharge for electricity, need to be reconsidered and a coherent framework for retail competition in all energy markets, including electricity distribution, needs to be

⁹ See, for example: <https://theodi.org/project/open-standards-for-the-uk-energy-sector/>

provided for. A coherent, consistent approach to remedies for the energy sector thus needs to be developed.

Access obligations – regulating for rivalry

In respect of a requirement to provide access, the legislation should permit the regulator to establish guidelines for turnaround times, and pricing for access in the event of a dispute between seeker and provider. The regulator should also be empowered to require that access be provided on an Equivalence of Inputs basis. This means that service providers at the retail level of a market should be able to replicate the retail offers made by vertically integrated distributors. For example, electricity distributors selling to end-users but also owning distribution network infrastructure should provide reference offers for access to their physical network infrastructure, on an Equivalence of Inputs basis, to third party distributors.

Tariffs

The principles of tariff regulation need to be consolidated across the energy sector. First, it is critical that the regulator be allowed the discretion to select from the various forms of regulation. This includes permitting the regulator to choose between rate of return and price cap regulation, each of which have various benefits and drawbacks that need to be weighed on a case-by-base basis as well as other suitable methodologies that arise (Table 1).¹⁰

Table 1: Price cap vs. rate of return regulation

	Price-cap	Rate of return
Firm's flexibility over relative prices	Yes	No
Regulatory lag (time between regulators award changes to allow for under-recovery or over-recovery of costs)	Long	Short
Sensitivity of prices to realized costs	Low	High
Regulatory discretion	Substantial	Limited
Incentives for efficient cost reduction	Strong	Limited
Incentives for durable sunk investment	Limited	Strong

Source: *Armstrong and Sappington (2007)*

In respect of rate of return regulation, the regulator ought to define consistent approaches to all of the various debates in this area, such as on the computation of the weighted average cost of capital (WACC), the regulatory asset base, permitting interest during construction, and the like. The regulator should be permitted to set generally applicable parameters, such as the equity beta for the WACC, across sectors since utilities that are natural monopolies are likely to face similar risks, as is the case in Australia for example.¹¹

Where a market is selected for ex-ante regulation, such as for electricity transmission activities, the structure of tariffs may become important. In this regard, it is important to

¹⁰ The courts have appeared to interpret Section 15 of the Electricity Regulation Act, for example, as not permitting the regulator to allow for benchmarking but rather the regulator must obtain detailed cost information, which suggests that price-cap regulation is not permitted. See, for example, the judgment of Judge E.M. Kubushi delivered on 20 October 2022 in the matter between the Nelson Mandela Bay Business Chambers NPC and another and the National Energy Regulator and others, case number 63393/2021.

¹¹ Source: Brattle Group, 2020, 'A Review of International Approaches to Regulated Rates of Return', available at: <https://www.aer.gov.au/system/files/Report%20to%20the%20AER%20-%20A%20Review%20of%20International%20Approaches%20to%20Regulated%20Rates%20of%20Return%20-%2030%20June%202020.pdf>

unbundle tariffs as far as possible and ensure that a tariff structure intended to achieve an objective, such as a capacity charge needed to pay for stand-by generation capacity which supports long-term grid stability, is not paid by customers that have interruptible loads, and that can therefore act themselves as stand-by generation capacity. This is a matter for the regulator to consider over time as regulations for markets identified as susceptible to ex-ante regulation are identified.

Vertical separation

There are several ways in which vertical separation might be achieved, from mere accounting separation to structural (ownership) separation, which the regulator should be permitted to order (Table 2). In-between these extremes, various forms of operational and management separation, including with separate management incentives, ought to be permitted. Vertical separation is an especially important remedy in the electricity sector, where owners of distribution and transmission grids, typically considered to be natural monopolies, should be vertically separated from generation, trading, and retail activities, given the strong likelihood that monopoly infrastructure will be leveraged to exclude rivals in complementary markets (generation, trading and retail). This allows for regulation of the monopoly components of the industry and competition and entry in the competitive components, while preventing the potential for vertically integrated companies to deny competitors access to essential inputs or to cross-subsidise.

Table 2: Six degrees of separation

<p><i>Ownership separation (in whole or in part)</i></p> <p><i>6 – Legal separation</i></p> <p><i>5 – Business separation with separate governance arrangements</i></p> <p><i>4 – Business separation with localised incentives</i></p> <p><i>3 – Business separation (BS)</i></p> <p><i>2 – Virtual separation</i></p> <p><i>1 – Creation of a wholesale division</i></p> <p><i>Accounting separation</i></p>
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Source: Cave, M. E. (2006). Six degrees of separation - operational separation as a remedy in European telecommunications regulation. Communications & Strategies 64: 89

The balance between light touch regulation to enable investors to plan investments taking on risk while seeking good returns and guarding against future control over essential facilities and the exploitation of market power in pricing underpins the EU's approach.

Regulation of third-party access will be considered from 2030 along with, vertical unbundling requirements and tariff regulation. The direction and principles are clear while allowing for substantial flexibility in the short term.¹²

3.2.2. Improving the regulator

In order to reduce the current levels of uncertainty in the energy sector, a range of reforms are needed for the regulator. First, the regulator's functions need to be made independent of the political process.¹³ For example, the ministerial discretion in Section 34 of the Electricity Regulation Act, relating to licensing, needs to be removed, and replaced with a general notification and registration regime, as explained above. Regulatory members ought to be recommended by the cabinet minister responsible, approved by Parliament, and appointed by the President. This should be based on transparent criterion related to the skills required for the position. Strict rules need to be in place to prevent arbitrary removal of such decision makers during their term of office. A further key principle is appropriate skills in the regulator, needed to reduce the scope for errors in regulatory decisions. The regulator's staff should be provided with the opportunity and incentivized to improve their skills on a regular basis. Furthermore, their performance should be carefully managed.

Operational deficiencies at the regulator also need to be addressed. In this regard, the regulator needs to be able to prioritise the matters that staff are assigned to and should be given the discretion not to intervene in markets or in respect of firm conduct where this has very little significance.

3.2.3. Better dispute resolution processes

The current dispute resolution in the energy sector has involved a range of court decisions that have taken years to arrive at a conclusive decision, causing considerable uncertainty for investors and customers of various energy products. A revised energy legal framework may need to include a different dispute resolution process, with regulated entities for instance first being required to follow mediation and private arbitration processes, before approaching the regulator or the courts for relief.

4. Scenario 3: A markets and competition regime

4.1. A regulatory regime for dynamic markets

The alternative to reforming the energy regulatory regime is to consolidate the appropriate regulatory powers with the flexible market analysis and enforcement of the Competition Commission. This recognises the need to balance different interests in a dynamic investment context where we need to open-up markets to rivalry, while guarding against abuse of market power.

Regulators for energy, telecommunications and ports are based on the existence of natural monopolies in critical network infrastructure generally built by the state. The privatisation (or commercialisation) of these facilities means that there is a need to constrain profit maximisation through the exertion of monopoly power. At the same time, entrenched market power may exist where there are not 'natural' monopolies. So, the Competition

¹² This is set out in the latest EU Renewable Energy Directive (RED III): RED III is part of the EU 'Fit for 55' package, presented July 14, 2021, to reduce emissions.

¹³ See, for example, Brown et al. (2006).

Commission's Data Market Inquiry identified unilateral price setting power on the part of Vodacom and MTN and required reductions in their pricing. There have also been competition cases against Telkom relating to pricing and access to the network which had not been addressed by the regulator. In products linked to liquid fuels (which are regulated) there have been competition cases involving Sasol in ammonia and related fertilizer products and in polypropylene which are not regulated.

In digital platforms, network effects mean markets can tip to quasi-monopoly positions for the lead firms. Competition authorities have been grappling with these around the world through inquiries and competition cases.¹⁴ The insights from the inquiries, along with various expert reviews, have led to the establishment of frameworks and rules to guard against the abuse of the market power and to ensure fair treatment of smaller businesses who use digital platforms while at the same time not preventing all the benefits which digital platforms bring to their users. In effect, the frameworks are drawing on competition standards for quasi-regulatory powers of rule-making and enforcement.

The changes happening in energy markets are as dynamic as in digital platforms when seen in the context of the innovation and investment required, and the imperative for it to benefit firms across the economy. Competition authorities may be able to move more responsively, especially using inquiry powers to obtain and analyse market information and to make decisions about how markets can work better. Countries such as the Netherlands and Australia have already brought regulation of some sectors such as telecommunications and energy under the same institution as competition to form the Authority for Competition and Markets (in the Netherlands) and the Australian Competition and Consumer Commission.

4.2. An empowered markets authority

A markets authority which includes appropriate powers to regulate energy markets along with competition enforcement has a range of potential institutional advantages.

First, in the context of scarce skills and expertise it builds a core institution with the economic, legal and finance knowledge to assess markets. By comparison, a proliferation of economic regulators risks simply the limited pool of skills moving from one to the other, potentially undermining the existing institutional strengths. A common set of analytical tools are required across different areas, alongside focused industry specific knowledge. Over the past two decades in South Africa, the competition authorities and regulators have built-up a substantial pool of economics and legal skills which can be consolidated in a core institutional base, rather than dispersed.

Second, the technological and business model changes which have happened in areas from telecoms, energy and transport to finance mean that we are much more concerned with understanding markets where large incumbents may have substantial market power while not being monopolists, as such. We need to assess barriers to entry, the potential for exclusionary conduct and how consumers behave. There is much more data available with the digitalisation of economic activity which enables better assessment of how markets are working by an authority with the appropriate institutional capacity.

Third, it is important to be flexible and responsive to market and industry developments rather than having long, drawn-out administrative processes. Evidence-based independent adjudication needs to be timeous if it is to be effective for businesses which need to plan and make decisions. Delays necessarily increase uncertainty. This implies learning from

¹⁴ Andreoni and Roberts (2022)

inquiries under the Competition Act which can assess why markets are not working well and make findings as to what changes are required. These are 'no fault' findings in that one or more firms with substantial market power are not being accused of contravening the Act with potentially high penalties to be imposed. Instead, relevant information is obtained and subjected to expert scrutiny, parties make representations, and an independent assessment is made in a transparent and fair process. Some parties will inevitably not like where the decision falls as it inevitably means adjudicating between different economic interests, however, everybody knows the rules of the game going forwards and can then strategise about how to play it to the best of their ability. This supports investment and reduces uncertainty. Such an approach to assessment of markets and conduct can be coupled with arbitration to resolve contestation between parties quickly.

4.3. An entrepreneurial-regulatory state

The markets regime involves an effective independent referee with good 'eyes' to see the conduct taking place in real-time and the powers to make timeous decisions. This is separate from policy (the development of the rules) but it does not mean the rules are not being updated for changing circumstances. Policies for renewable energy to green hydrogen are essential to capture the social benefits, the positive externality effects and the potential for broad-based linkages within a new green growth path. For example, subsidies for research, infrastructure and skills development are all crucial as they unlock the economic activity which will yield huge returns. Individual firms cannot capture the economy wide returns from these investments and so the state must support them. The state support should not favour individual national champions who will capture the lions share and exclude smaller rivals. Instead, effective state support is complementary to growth of competitive markets overseen by an effective markets regime (or referee). This is an entrepreneurial-regulatory state where rules are shaped to reward effort, innovation, investments and creativity (Andreoni and Roberts, 2022).

5. Framework for weighing-up alternatives

In deciding on a policy and regulatory framework that would be fit for purpose in a changing energy landscape we consider the options against three key considerations, bearing in mind that each have pros and cons and that a large part of the performance of a regulatory framework is how it is implemented in practice, and not the design, as such.

Appropriate and responsive?

An appropriate regulatory framework is one which is coherent and consistent. Clear criteria by which factors are going to be weighed-up is important for reducing uncertainty.

This is especially important in the context of regulating for green hydrogen for energy as this requires incentivizing new investments with substantial spillovers and positive externality effects, and investments in expanded infrastructure across related activities. It is very dynamic as the technologies mature and costs change with the expansion of activities, learning effects and realization of economies of scale.

The appropriate regulatory framework needs to be accompanied by clear and credible commitment to appropriate policies, being those which provide transparent support for the investments in the new activities and in the critical infrastructure. Above all, appropriate policies are required to support investment in the transmission grids, without which participants at different levels, from renewable energy and hydrogen production through to

users of green hydrogen to switch from fossil fuels, cannot plan. The shared transmission networks should be vertically separated from the generation and users, even if they remain in state hands. These are structural reforms which have been proposed to separate electricity transmission from generation and now must be put in place.

From a very general perspective, appropriate regulation to incentivize investments in new activities would require **light touch regulation where there is no clear market failure**, and a focus on regulation only for the specific part of the value chain that is subject to market failure or is a natural monopoly, such as transmission grids and large pipelines. As such, the scope of regulation should narrow considerably. Investors take risks and are able to calculate these risks without having them exacerbated by uncertain regulations.

The need to have one framework across the different levels suggests scenario 3 may be most appropriate. Abuse of market power provisions could be used for enforcement.

Independent and fair

The regulatory framework needs to be independent and seen to be fair, in terms of process and outcomes. South Africa has established independent economic regulators. These generally fall under the relevant government departments of the sectors that they regulate. There are also regulatory functions in the hands of the government departments, notably fuel prices in the DMRE.

Independence requires the appointments of decision-makers to be sufficiently arms-length from sector interests and the large incumbents with which government necessarily engages when formulating policy.

Combining the regulatory role with competition enforcement in a markets authority has the advantage of reinforcing the independence of the authority from a line department, while the department maintains responsibility for the appropriate policies. The appointments to the executive of the authority and decision-makers (on a tribunal) are made with a view to broad-based relevant skills and experience (such as in law, economics and finance). In some countries this is on the advice and input of professional bodies.

It may be argued that a non-specialist regulator does not have the depth of knowledge and experience to understand the technical issues of the sector. For example, telecommunications need specialists in spectrum, financial markets in payments systems, and energy markets requires knowledge of generation and engineering. First, these considerations apply to differing extents across sectors. It may be true for financial services but not for telecommunications. Second, it changes over time. In particular, technology changes have dramatically changed telecommunications from the time when the regulator was established to oversee access and pricing of a copper fixed line network with connections into most households and businesses. If the regulatory regime is not updated, then we risk having analogue regulation for a digital age. The revolution which is underway in the shift to green energy implies similarly major changes.

The authority will continue to require technical specialists. The issue is whether the specificities of the sector require the authority to be separate from the institution charged with overseeing rules for markets, or whether the synergies and overlaps imply merging the bodies while having focused competencies, now inside the institution.

Fairness dictates clear rules applied transparently and impartially. This is the case whichever regulatory regime is decided upon. Fairness in practice means ensuring that less well-resourced parties have an equal opportunity to make effective representations and that the

authority acts on the behalf of dispersed interests such as on consumers and SMEs who may be excluded. In competition cases, the high penalties which can be imposed, albeit has meant protections for respondents, with extensive hearing processes and burdens on the authority in terms of how investigations can be conducted and decisions made and enforced. These protections may mean the process takes time and may involve extensive legal proceedings requiring costly resources, which can delay the recourse for those harmed by the exercise of substantial market power.

The balance must be struck between the likelihood and costs of: under-enforcement, where there is harm to the economy and less powerful agents such as consumers and SMEs; and, over-enforcement, where the firms making investments which realise profits and may place them in a position of market power are unreasonably penalized and are not fully rewarded for the risk, innovations and effort involved.

Timely and efficient (agile?)

Where there is regulation, it is necessary that **regulation is quick**. While processes for accountability are important, decisions should not be subject to long delays and the regulator must be capacitated to take decisions within a fairly short timeframe. Appeal processes need to be streamlined.

In an administrative regime, the decisions are generally about adjudicating between different claims on flows of revenue and returns, and it is important for business decision-making for this adjudication to happen timeously. Long appeal processes which reward litigants with deep-pockets undermine investment and in itself creates uncertainty.

A regulatory regime which is adversarial is inappropriate. South Africa's regime has erred on this direction. Decisions have been challenged and remain not finalized for many years, as long as a decade. Major competition cases have typically taken around a decade for the main challenges and appeal processes to be exhausted. This can be viewed as part of the normal maturing of the regimes. Moreover, where substantial penalties are imposed, including criminal fines, then the protections are understandable. This must be distinguished from the process of weighing-up the pros and cons in terms of market outcomes where there are inherent imperfections and market power.

Whether an improved economic regulator or a combined markets authority regime is adopted, decision-making must be much more efficient. This can be through alternative dispute resolution mechanisms which allow for a proper interrogation of the facts and a weighing-up, but without overly legalistic and litigious processes. In the case of renewable energy for hydrogen there is an imperative for new investments to be facilitated in a dynamic environment where there is uncertainty by the nature of the technologies involved and changes required. We cannot afford for decades to pass while the regime matures, especially as the changes underway mean that the regime must continuously evolve and cannot stand still while case precedent is developed through cumbersome court cases.

6. Conclusions

At present the current regulatory framework and regime is not appropriate for supporting changes in the industry and the introduction of investment intensive new technologies such as green hydrogen.

As such, some changes in the regulatory structure are required. This can take different forms. Either a better capacitated and more powerful regulator, or a markets authority with deeper skills and expertise is likely to be an improvement. However, which form is

appropriate is context specific. It depends on implementation, the appropriate policy framework and the specifics of the market itself.

Within a South African context, Scenario 3, namely a market regulator has some advantages. This is for several reasons. Firstly, a market regulatory with responsibility for various markets may have better independence from political interference from line ministries than separate sectoral regulators. Secondly, having a common authority could create better alignment and policy coherence across sectors. Thirdly, a common authority is likely to be appropriate in a country in which there are both budgetary and skills shortages. It would allow the authority to deepen expertise in particular areas (for example, financial or data experts) given the expertise would be used across a range of departments. It would also potentially allow for cross-pollination of ideas and skills. The Competition Authorities in South Africa have a fairly strong institutional base that could be used to build up this authority.

However, creating such a regulator is a major process of overhaul. It is likely to require extended consultation and changes to a range of laws. It is likely that setting up such a regulator will take some time. While it is likely to be a laudable longer term regulatory objective it would be problematic if the extent of the reforms required from an institutional perspective delay the necessary sectoral reforms required more immediately to improve the regime which exists.

Therefore, we suggest regulatory reforms to the current system, namely a Scenario 2 approach. This should focus on creating lighter touch regulation, where appropriate, to support investment by prioritizing interventions which address a clear market failure (for example using a competition framework). There should be adjustments to ensure that the authority is able to set tariffs in an efficient manner (through remedying overtly prescriptive legislation), build skills and capacity at regulator level and create quicker dispute resolution processes.

In the medium-term there should be planning for reforms to create a markets authority which brings energy regulation under the same roof as competition.

7. References

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