Centre *for* Environmental Rights
Advancing Environmental Rights in South Africa

Director-General
Department of Energy
Mr Thabane Zulu

For the attention of:

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Copied to:

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Per email: jacob.mbele@energy.gov.za

Our ref: CER34.25
26 October 2018

Dear Sir

COMMENTS ON THE DRAFT INTEGRATED RESOURCE PLAN FOR ELECTRICITY, 2018

1. We write to you as the Centre for Environmental Rights. We represent numerous communities and civil society organisations in South Africa, assisting them to realise their Constitutional rights to a healthy environment by advocating and litigating for environmental justice.[1]

2. The Centre for Environmental Rights also forms part of the Life After Coal/Impilo Ngaphandle Kwamalahle Campaign[2] - a joint campaign with Earthlife Africa[3] and groundWork,[4] which seeks to: discourage the development of new coal coal-fired power stations and mines; reduce emissions from existing coal infrastructure and encourage a coal phase-out; and enable a just transition to sustainable energy systems for the people.

3. We refer to the draft Integrated Resource Plan for Electricity, published for 60 days' comment on 27 August 2018 ("draft IRP 2018"). Accordingly, comments are due today, 26 October 2018.[5]

4. The supporting reports to the draft IRP 2018, made available on the Department of Energy (DoE) website include the following:

[1] https://cer.org.za/.
[2] https://lifeaftercoal.org.za/.
[3] http://earthlife.org.za/.
[4] http://www.groundwork.org.za/.
[5] See s4 of the Interpretation Act 33 of 1957, which deals with the reckoning of the number of days.

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4.1. "Forecasts for Electricity Demand in South Africa (2017 – 2050) using the CSIR Sectoral Regression Model for the Integrated Resource Plan of South Africa";[6]

4.2. "Power Generation Technology Data for Integrated Resource Plan of South Africa";[7]

4.3. "Report on High Level Costing for Collector Stations for Generation Prepared for input into the Integrated Resource Plan";[8] and

4.4. "Socio-Economic Impact Assessment System" (SEIAS).[9]

5. We refer to research conducted by Synapse Energy Economics Inc,[10] a research and consulting firm based in the United States (US) specialising in energy, economic, and environmental topics ("the Synapse Report"). The Synapse Report assesses the draft IRP 2018 against best practice standards and evaluates the extent to which various aspects of the draft IRP 2018 follow basic IRP best practice standards. We attach a copy of the Synapse Report as **Annexure A**. In short, the main concerns identified with the draft IRP 2018, according to the Synapse Report – which are addressed in more detail below - were the following:

5.1. an unreasonably high load forecast;

5.2. unreasonably high cost projections for renewables and battery storage - the draft IRP 2018 does not sufficiently account for recent and projected declines in the costs of solar, wind, and battery storage resources;

5.3. inadequate evaluation of existing generating units and planned unit additions;

5.4. poorly-supported fuel price assumptions;

5.5. unsupported renewable build limits;

5.6. inadequate consideration of environmental impacts;

5.7. a disconnect between modeling findings and the resource plan, as the proposed IRP calls for the addition of more than 6 500MW of new coal capacity over the next six years; yet none of the optimised IRP modeling scenarios involve the construction of any coal capacity during the 2020s - this disconnect runs counter to the purpose of an IRP; and

5.8. limited public documentation of analysis.[11]

6. We record that we support the comments submitted by groundWork on the draft IRP 2018, of 26 October 2018.

7. We have already made written comments on the draft IRP 2018 to the Portfolio Committee on Energy (submitted on 5 October 2018).[12] We also gave an oral presentation to the Portfolio Committee on 16 October 2018 – conveying the concerns set out in the written comments, and predominantly our concerns about the inclusion of

[6] http://www.energy.gov.za/IRP/irp-update-draft-report2018/CSIR-annual-elec-demand-forecasts-IRP-2015.pdf.
[7] http://www.energy.gov.za/IRP/irp-update-draft-report2018/EPRI-Report-2017.pdf.
[8] http://www.energy.gov.za/IRP/irp-update-draft-report2018/Report-High-Level-Costing-for-Collector-Stations.pdf.
[9] http://www.energy.gov.za/IRP/irp-update-draft-report2018/AnnexureE-IRP-SEIAS-Draft-as-Approved-by-DPME.pdf.
[10] http://www.synapse-energy.com/.
[11] P1 and p21 – 22, Synapse Report.
[12] The comments to the Portfolio Committee can be accessed here https://cer.org.za/wp-content/uploads/2018/10/CER-IRP-Comments-PCE-5-10-18.pdf, and can be made available on request.

1000MW of new coal capacity in the draft IRP 2018. We record that no questions were asked by the committee members of any of the presenters or DoE during the full day of the hearing. Even though some contradictory information was presented there was no interrogation from the Portfolio Committee members. A group of civil society organisations have addressed a letter of concerns to the Portfolio Committee and DoE regarding the process of the hearings and the content of the draft IRP 2018 - setting out key principles and components for the IRP that must, as a minimum.[13] The Life After Coal Campaign is a signatory to that letter.

8. We record our concern that the DoE has not held public engagements on the draft IRP 2018. We refer to our comments at paragraphs 200 and 201 below in this regard, and also emphasise the importance of facilitating meaningful public engagement on the IRP, particularly with those who are most impacted by South Africa's electricity planning decisions – the communities based in the Mpumalanga Highveld, the Vaal Triangle, and the Waterberg, for example. Communities residing in South Africa's Highveld, in particular, have been and continue to be subjected to a grave injustice as a result of severe pollution, due to the concentration of coal mines, which primarily supply twelve of Eskom's fleet of existing power stations – also in the Highveld. A failure to adequately consider the external costs of our power choices and their impacts on affected communities, and a failure to adequately consult with them on South Africa's electricity planning, would result in the perpetuation of this injustice, unfairly discriminating against vulnerable and disadvantaged persons.

9. We note that – according to the draft IRP 2018 – this update of the current IRP 2010-2030, promulgated in 2011 ("IRP 2010"), is necessitated by capacity additions and changes of key assumptions including regarding: demand projections; Eskom's existing plant performance; and new technology costs.[14]

10. While we commend the draft IRP 2018 on being an improvement from the draft IRP published in November 2016 ("draft IRP 2016") and on the IRP 2010, we still have numerous concerns with the draft IRP 2018. In particular we are concerned with, and object to:

    10.1. the inclusion of new coal capacity;

    10.2. the annual constraint placed on renewable energy capacity up until 2030;

    10.3. the lack of any consideration of external costs and impacts of various electricity sources for water, health, ecosystems, and climate, and the inadequate assessment of emissions (health) costs;

    10.4. the failure to adequately convey the urgency and need to rapidly transition from fossil fuels and the need to effectively eliminate greenhouse gas (GHG) emissions from the electricity sector as soon as possible;

    10.5. the plans for the decommissioning of South Africa's existing coal fleet;

    10.6. the extensive provision for new gas capacity and the lack of any clarity on, *inter alia*, the sources of gas;

    10.7. the lack of adequate provision for, or consideration of, aspects, which significantly affect assumptions around South Africa's electricity needs and planning, such as: demand; technology costs; risks relating to grid stability; and the rapidly changing energy landscape; and

    10.8. the failure to conduct consultations on the draft IRP 2018 and to provide stakeholders with the modelling data, crucial for effective and meaningful consideration of and participation on the draft IRP 2018.

11. We address each of these points in turn in more detail below. First, we outline the legal requirements for the IRP.

[13] The letter is available at https://www.egsa.org.za/resources/climate-change/response-to-irp-public-hearings-and-expectations-for-the-irp-itself/.
[14] P15, draft IRP 2018.

Legal Requirements for an IRP

12. We note that the draft IRP 2018's own description of the IRP is that it "*is an electricity infrastructure development plan based on **least-cost** supply and demand balance taking into account security of supply and the **environment (minimize negative emissions and water usage)***" (emphasis added).[15] The draft IRP 2018 should, therefore, give effect to these requirements, yet no reference is made in the draft IRP 2018 at all to water usage or water externalities (as detailed below in paragraphs 98 to 123), and considerations of least-cost options and environmental impacts, including air pollution emissions, are, in large part, ignored in the draft IRP 2018, as explained below.

13. The IRP must comply with, and fall within the ambit of, various laws and obligations. The laws and policies which are relevant and relied upon for purposes of these comments are listed below.

The Constitution

14. As a crucial planning document with far-reaching impacts for health, well-being, the economy, the climate, our air and water resources and the environment more broadly, the IRP has implications for numerous fundamental rights enshrined in the Bill of Rights in the Constitution of the Republic of South Africa, 1994 ("the Constitution"). Government must ensure that the IRP respects, protects, promotes and fulfils these rights, as opposed to conflicting with them.

15. In particular, the Constitution guarantees a right to an environment that is not harmful to health or well-being; and to have the environment protected, for the benefit of present and future generations. The state has a duty to take reasonable legislative and other measures to give effect to that right.

16. We point out that the Freedom Charter of the African National Congress also recognises the need to protect the well-being of the people of South Africa from the harmful impacts of industrial activity, stating that "*(a)ll other industry and trade shall be controlled to assist the well-being of the people*".[16]

17. Other Constitutional rights that are relevant include: the right of access to water;[17] the right to equality;[18] the right to human dignity;[19] to just administrative action[20] and of access to information[21]- that the state has an obligation to ensure that there is adequate public consultation and engagement with the public at all stages of developing the IRP.

18. In making the above objections, we submit that many of the various issues listed above and detailed below, render the draft IRP 2018 in conflict with the Constitution, as the supreme law of the Republic.

The National Environmental Management Act

19. The IRP would also have to be aligned, and comply with, the National Environmental Management Act, 1998 (NEMA). NEMA was enacted to give effect to section 24 of the Constitution. This is national legislation binding on **all** state bodies, to develop, *inter alia*, a framework for integrating good environmental management into **all** development activities.[22] In this regard, it is fundamental that the electricity planning for the IRP include a study of the environmental impacts of the proposed electricity choices (see paragraph 98 below). While such

[15] P14, draft IRP 2018.
[16] See http://www.historicalpapers.wits.ac.za/inventories/inv_pdfo/AD1137/AD1137-Ea6-1-001-jpeg.pdf.
[17] S27, the Constitution.
[18] S9, the Constitution.
[19] S10, the Constitution.
[20] S33, the Constitution.
[21] S32, the Constitution.
[22] Preamble, NEMA.

assessments must be done when specific projects have been proposed; these impacts also need to be assessed earlier on in the process.

20. In our experience, decision-makers often argue that it is too late to go back and revisit decisions, where those decisions are allegedly aligned with existing policy. This is the case, for example, in relation to the environmental authorisations for the proposed coal independent power producers (IPPs),[23] which are currently subject to review proceedings in the High Court. Although the assessments of impacts must certainly be done at project-level and on a case-by-case basis, it is also imperative that the global and national impacts of burning coal and other fossil fuels, for example, are comprehensively studied at the planning stage, for both the IRP and the Integrated Energy Plan (IEP).

21. Section 2 of NEMA lists principles - the National Environmental Management (NEM) Principles - which are guidelines by reference to which any organ of state, including DoE, must exercise any function when taking any decision which may significantly affect the environment.[24] Decisions in relation to the IRP must therefore be aligned with section 2 of NEMA. This includes, for example, the principle that "*environmental justice must be pursued so that adverse environmental impacts shall not be distributed in such a manner as to unfairly discriminate against any person, particularly vulnerable and disadvantaged persons*."[25]

22. Section 28 of NEMA places a duty of care on every person who "*causes, has caused or may cause significant pollution or degradation of the environment [to] take reasonable measures to prevent such pollution or degradation from occurring, continuing or recurring, or, in so far as such harm to the environment is authorised by law or cannot reasonably be avoided or stopped, to minimise and rectify such pollution or degradation of the environment*."[26] This duty extends to all organs of state, including the DoE. Given the potential risks of significant harm, which is currently being caused by and/or could arise from the various electricity options to be selected and incorporated into South Africa's electricity planning, the DoE is under an obligation to ensure that the IRP does not give rise to continued or recurring pollution and environmental degradation.

Electricity Regulation Act

23. The Electricity Regulation Act, 2006 (ERA) serves as the governing legislation for the IRP; it defines the IRP as "*a resource plan established by the national sphere of government to give effect to national policy*."[27]

24. In terms of regulation 4 of the Electricity Regulations on New Generation Capacity, 2011 ("New Generation Regulations") promulgated under the ERA, the IRP must be developed by the Minister, after consultation with the National Energy Regulator of South Africa (NERSA) and be published in the Gazette.[28] "*The system operator, the NTC [National Transmission Company] and the Regulator shall timeously provide such assistance as the Minister may require for purposes of developing and monitoring the implementation of an integrated resource plan*."[29]

25. The objects of the ERA, as set out in section 2, are to, *inter alia*:

> *"(a) achieve the efficient, effective, sustainable and orderly development and operation of electricity supply infrastructure in South Africa;*
> *(b) ensure that the* ***interests and needs of present and future electricity customers and end users are safeguarded*** *and met, having regard to the governance, efficiency, effectiveness and long-term*

[23] This refers to the Thabametsi and Khanyisa proposed IPP coal-fired power stations.
[24] Section 2(1), NEMA.
[25] S2(4)(c), NEMA.
[26] S28(1), NEMA.
[27] S1, definition of 'integrated resources plan', ERA.
[28] Regulation 4(1), New Generation Regulations.
[29] Regulation 4(2), New Generation Regulations.

sustainability of the electricity supply industry within the broader context of economic energy regulation in the Republic;… and
(g) facilitate a fair balance between the interests of customers and end users, licensees, investors in the electricity supply industry and the public" (emphasis added).

26. The obligation to ensure that these objectives are met, rests with the state, and certainly the IRP must be aligned with these objectives.

National Policy

27. ERA states, in the definition of the IRP, that the IRP must "*give effect to national policy*". The IRP would thus be unlawful if it does not give effect to national policy. Some of the policies that would be relevant in this instance include the following:

    27.1. The 1998 White Paper on Energy Policy ("Energy White Paper"),[30] which recognises stimulating economic development and managing energy-related environmental and health impacts as some of its key objectives. It also states that: "*government policy is to remove distortions and encourage energy prices to be as cost-reflective as possible. To this end prices will increasingly include quantifiable externalities*";[31] "*Government expects electricity tariffs to become increasingly cost-reflective at all levels of the industry*";[32] and "*Government believes that renewables can in many cases provide the least cost energy service, particularly when social and environmental costs are included, and will therefore provide focused support for the development, demonstration and applications of renewable energy*."[33]

    27.2. The 2003 White Paper on Renewable Energy ("RE White Paper") states that, "*[w]hile South Africa is well endowed with renewable energy resources that can be sustainable alternatives to fossil fuels, so far these have remained largely untapped … Government will develop the framework within which the renewable energy industry can operate, grow, and contribute positively to the South African economy and to the global environment*"[34] and "*Government's long-term goal is the establishment of a renewable energy industry producing modern energy carriers that will offer in future years a sustainable, fully non-subsidised alternative to fossil fuels*."[35]

    27.3. The 2011 Climate Change Response White Paper confirms that South Africa as a country is extremely vulnerable to the impacts of climate change.[36] It further states the following, which is relevant to the IRP and electricity planning:

        27.3.1. "*In terms of South Africa's latest Greenhouse Gas Inventory (base year 2000), the majority of South Africa's energy emissions arose from electricity generation, which constituted around half of South Africa's energy emissions and just under 40% of total emissions in 2000*."[37]

        27.3.2. "*The **main opportunities for mitigation consist of energy efficiency, demand management and moving to a less emissions-intensive energy mix, with consequent economic benefits** of improved efficiency and competitiveness as well as incentivising economic growth in sectors with lower energy intensities. **Policy decisions on new infrastructure investments must***

[30] http://www.energy.gov.za/files/policies/whitepaper_energypolicy_1998.pdf.
[31] P8 – 9, White Paper on Energy Policy, http://www.energy.gov.za/files/policies/whitepaper_energypolicy_1998.pdf.
[32] P12, White Paper on Energy Policy.
[33] P14, White Paper on Energy Policy.
[34] Pviii.
[35] Pix.
[36] P8.
[37] P26.

consider climate change impacts to avoid the lock-in of emissions-intensive technologies into the future"[38] (emphasis added).

27.4. The National Development Plan (NDP) 2030 calls for an energy sector that, by 2030, promotes: "*economic growth and development through adequate investment in energy infrastructure. The sector should provide reliable and efficient energy service at competitive rates, while supporting economic growth through job creation*"; "***social equity through expanded access to energy at affordable tariffs and through targeted, sustainable subsidies for needy households***" (emphasis added); and "***environmental sustainability through efforts to reduce pollution and mitigate the effects of climate change***" (emphasis added).[39] The NDP is referred to in the draft IRP 2018 as having the stated vision for 2030 of "*an energy sector that provides reliable and efficient energy service at competitive rates, is socially equitable through expanded access to energy at affordable tariffs and that is environmentally sustainable through reduced pollution*".[40]

28. South Africa's international climate change commitments in terms of the ratified Paris Agreement on Climate Change[41] and, as set out in the country's Nationally Determined Contribution (NDC)[42] – to be updated and made stricter, every five years - are also of great importance in this context and in relation to the IRP.

29. The above policy documents set out a clear intention for the electricity sector to be cost-reflective and competitive; for electricity tariffs to be affordable; for electricity prices to factor-in externalities; and for consideration to be given to environmental and climate change impacts – highlighting the importance of taking steps to reduce GHG emissions in the electricity sector for purposes of mitigating the severe impacts of climate change. The IRP (as per its definition in ERA) is required to give effect to these policies. For the reasons set out below, we submit that the draft IRP 2018 does not meet this requirement.

Integrated Energy Plan

30. The Integrated Energy Plan (IEP) is intended to be a plan for South Africa's broader energy mix, as regulated by the National Energy Act, 2008 (NEA).

31. At present, there is no promulgated IEP. Further, section 6 of the NEA, which places an obligation on the Minister to develop, and, on an annual basis, review and publish the IEP in the Gazette,[43] has not yet been promulgated. To date, no final IEP has ever been adopted. A draft was published for comment in July 2013, and a further draft was published for comment in 2016.

32. We note that the IRP has been described as a "*subset of the IEP*".[44] The draft IRP 2018, in addressing public comments in relation to the link between the IRP and IEP and which one comes first, states that "*the IEP does not necessarily come first and that the two plans feed into each other*."[45]

33. We record our concern that a further draft IEP has not been published for consideration and comment alongside the IRP – as both clearly have significant implications for South Africa. The IEP is also a crucial planning document of great relevance to electricity planning and the IRP. The publication of the IEP, and promulgation of section 6 of the NEA, should be prioritised.

[38] P26.
[39] P163, NDP.
[40] P14 of the draft IRP 2018.
[41] https://unfccc.int/files/essential_background/convention/application/pdf/english_paris_agreement.pdf.
[42] http://www4.unfccc.int/ndcregistry/PublishedDocuments/South%20Africa%20First/South%20Africa.pdf.
[43] Section 6(1), the National Energy Act.
[44] See http://www.energy.gov.za/files/docs/Frequently-asked-questions-IRP-and-IEP.pdf at p2.
[45] P70, draft IRP 2018.

Climate Change Bill 2018

34. While not yet final legislation, the Climate Change Bill,[46] published for comment in June 2018, would – once promulgated - have significant implications for the IRP and energy sector more broadly.

35. The Bill makes provision for sectoral emission targets (SETs), aligned with a national GHG emissions trajectory, which must be determined by the Minister of Environmental Affairs, and reviewed and updated every five years for GHG-emitting sectors and subsectors. The Minister responsible for each sector - energy included - must prepare a sector emissions reduction plan (SERP), which sets out how the sector will meet its target, and they must report annually on progress. This begs the question of the interaction and alignment between the draft IRP 2018, future revisions of the IRP, the SET to be allocated to energy and the energy sector's SERPs; which the Minister of Energy will be required to prepare, and comply with, for the electricity sector.

36. There is further uncertainty regarding the carbon dioxide (CO_2) emission constraint used in the draft IRP 2018 and whether this will align with the national GHG emissions trajectory, to be determined by the Minister of Environmental Affairs under the Climate Change Bill, defined as "*a benchmark against which the efficacy of GHG emissions reduction actions will be measured*".[47]

37. There must be clarity and consideration given – in finalising the IRP – to the need for alignment with the future Climate Change Act, based on the content of the Bill, as amended following public participation.

Objections to the draft IRP 2018

38. We submit that the issues detailed below would render the draft IRP 2018 unlawful and in conflict with the Constitution, NEMA, and the ERA.

Provision for new coal capacity

39. As stated above, we commend the draft IRP 2018 for having substantially less coal capacity than the draft IRP 2016 and for not committing to any new coal capacity post 2030, acknowledging that, for the period post 2030, "*[a]dopting no annual build limits on renewables or imposing a more stringent strategy to reduce greenhouse gas emissions implies that no new coal power plants will be built in the future unless affordable cleaner forms of coal-to-power are available*".[48] We point out that the possibility of "cleaner" and cost-competitive coal-to-power options becoming available is highly unlikely, if not impossible, particularly if comparing coal with ever-progressing renewable energy technologies – which are continuously becoming cheaper - and when giving full consideration to externalities of the various electricity options. Coal will never be adequately cleaner or cheaper than renewable energy. On this basis, it should be completely disregarded in the IRP, including post 2030.

40. We note that the draft IRP 2018 makes provision for 6 732MW of new coal capacity to come online between 2019 and 2024. 5 732MW of that capacity pertains to "*committed and already contracted capacity*"[49] – this being the remaining units for Eskom's Medupi and Kusile coal plants, expected to come online between 2019 and 2022 as per Table 4 of the draft IRP 2018. 1 000MW of the new coal capacity from 2023 refers to "*new additional capacity*".[50]

41. In relation to the remaining units of "*committed and already contracted*" capacity to come online from Medupi and Kusile, we refer to a 2017 study by Meridian Economics, based on modelling by the Council for Scientific and Industrial Research (CSIR), titled "Eskom's Financial Crisis and the Viability of Coal-Fired Power in South Africa"

[46] https://www.environment.gov.za/sites/default/files/legislations/climatechangebill2018_gn41689.pdf.
[47] S1, Climate Change Bill.
[48] P12, draft IRP 2018.
[49] P41, draft IRP 2018.
[50] P41, draft IRP 2018.

("the Meridian study").[51] The Meridian study shows that the completion of Kusile coal-fired power station is not necessary to meet demand and that, in fact, Eskom could save money (approximately R4 million) by abandoning the remaining two units of Kusile, stating that "*it will be more economic to cancel the construction of Kusile units 5 and 6 than to complete it, even considering that other resources will have to be employed in future to replace the supplies that would have come from units 5 & 6*."[52]

42. A further study by Blignaut of the Department of Economics at the University of Pretoria titled "Climate change: The opportunity cost of Medupi and Kusile power stations"[53] finds that the damage costs – resulting from climate change impacts that will be caused by Medupi and Kusile are likely to range between "*R6.3 billion and R10.7 billion per year. This converts to a damage cost of between R0.10 and R0.17/kWh when assuming a net combined generation capacity of 8 677 MW and a load factor of 85%."* It also finds that committing to Medupi and Kusile, pushes out 21 700MW of potential renewable electricity alternatives.[54] A further 2012 study by Inglesi-Lotz and Blignaut on Medupi and Kusile's water costs[55] finds that Kusile's water requirements, compared to solar power, result in an annual foregone revenue of R26.7 billion.

43. We therefore recommend that the amount of "*committed and already contracted*" capacity be seriously reconsidered in the final IRP in line with the research of Meridian Economics, Blignaut, Inglesi-Lotz and the CSIR. An IRP focused on identifying a least-cost plan for South Africans should evaluate whether this new capacity is cost-effective and necessary, rather than simply incorporating it as a foregone conclusion.

44. We presume that the 1 000MW of new additional capacity refers to the two preferred bidders under the first bid window of the Coal Baseload Independent Power Producer Procurement Programme ("Coal IPP Programme") – these being the proposed Thabametsi (557MW net capacity) and Khanyisa (306MW net capacity) coal-fired power stations ("the coal IPPs"). **We strongly object to this provision for 1 000MW of new coal capacity in the draft IRP 2018**.

45. The draft IRP 2018 confirms that "*[w]ithout a policy intervention, all technologies included in the promulgated IRP 2010–2030 where prices have not come down like in the case of PV and wind, cease to be deployed because the least-cost option only contains PV, wind and gas*"[56] and that "*[t]he scenario without renewable energy annual build limits provides the least-cost option by 2030*."[57]

46. The new coal capacity to come from the coal IPPs is only included as part of the policy-adjusted plan up to 2030. In other words, the 1 000MW new coal has been "forced in" to the draft IRP 2018. The draft IRP 2018 states that: "*[i]nclusion of 1000MW of coal-to-power in 2023–2024, based on two already procured and announced projects. Jobs created from the projects will go a long way towards minimizing the impact of job losses resulting from the decommissioning of Eskom coal power plants and will ensure continued utilisation of skills developed for the Medupi and Kusile projects*." [58] This **directly contradicts the draft IRP 2018's own statement** that it is intended to be a "*plan based on **least-cost supply and demand balance** taking into account **security of supply and the environment (minimize negative emissions and water usage)**"* (emphasis added).[59] We, for the reasons set out below, do **not** regard this as an acceptable, correct, or lawful justification for the coal IPPs, particularly in light of:

[51] Available at http://meridianeconomics.co.za/wp-content/uploads/2017/11/Eskoms-financial-crisis-and-the-viability-of-coalfired-power-in-SA_ME_20171115.pdf.
[52] Piv and v, Meridian study.
[53] Available at http://www.scielo.org.za/pdf/jesa/v23n4/07.pdf
[54] P73, Climate change: The opportunity cost of Medupi and Kusile power stations, at http://www.scielo.org.za/pdf/jesa/v23n4/07.pdf.
[55] Available at https://www.sajs.co.za/index.php/jesa/article/view/3180.
[56] P37, draft IRP 2018.
[57] P12, draft IRP 2018.
[58] P39, draft IRP 2018.
[59] P14, draft IRP 2018.

the harmful impacts of building and operating coal-fired power stations, their excessive costs - in circumstances where South Africa has excess capacity – and the fact that the coal IPPs are a long way from being "procured".

47. The draft IRP 2018 appears to make no reference to status of the 2012 Ministerial Determination (GN 1075) for 2 500MW of new coal capacity ("the Coal Determination") – in terms of which the Coal IPP Programme came into being and, consequently, the coal IPPs. For example, it states that "*… Ministerial Determinations for capacity beyond Bid Window 4 … must be reviewed and revised in line with the new projected system requirements for the period ending 2030*".[60] This relates to the Renewable IPP Procurement Programme ("Renewable IPP Programme"); no reference is made to the Coal Determination. Clarity on this and the status of the Coal Determination should be provided, particularly in light of the submissions above and below regarding the unlawfulness of including new coal capacity in the IRP. The capacity provided for in the Coal Determination – including the 1 000MW in the IRP - must therefore also be reviewed and revised.

Harmful impacts of building and operating new coal-fired power stations

48. In our submissions on the draft IRP 2016, we explained in detail that, in relation to coal-fired power as a proposed and continued electricity source:

    48.1. the pollutants emitted when burning coal – which include particulate matter (PM); sulphur dioxide (SO_2); nitrogen oxides (NOx); mercury (Hg); and carbon dioxide (CO_2) – are highly harmful to human health. The fine PM ($PM_{2.5}$) emissions from Eskom's coal-fired power stations alone give rise to 2 200 attributable deaths every year, according to a 2016 study by Dr Mike Holland titled "the Health Impacts of Coal Fired Power Plants in South Africa";[61]

    48.2. coal-fired power stations emit GHGs, such as CO_2 and nitrous oxide (N_2O), which contribute significantly to climate change;

    48.3. coal-fired power stations require large volumes of water in order to operate, and pose a risk of polluting water in the areas in which they operate and store their coal and toxic ash waste;

    48.4. the mining of coal causes significant and long-term pollution of water resources, particularly through acid mine drainage; and

    48.5. the mining and transporting of coal results in further air emissions which are harmful to human health, including emissions from spontaneous combustion on coal mines and discard heaps; and coal dust that causes significant impairment of health, as well as methane (CH_4) emissions - the second (along with CO_2) big contributor to climate change.

49. We submit that the **provision for new, and continued reliance on, coal-fired electricity gives rise to unjustifiable violations of people's rights to an environment not harmful to health or well-being**.

50. In relation to Thabametsi and Khanyisa (which, it appears, make up the 1 000MW in the draft IRP 2018) specifically, we point out the following impacts:

    50.1. Both projects will be two of the most GHG emission-intensive coal plants in South Africa (and higher than the world average), 60% more so than Eskom's Medupi and Kusile coal plants – as a result of, *inter alia*, the fluidised bed combustion technology they propose to use.[62]

[60] P12, draft IRP 2018.
[61] See https://lifeaftercoal.org.za/wp-content/uploads/2017/04/Annexure-A4.pdf at p15.
[62] P10, ERC Coal IPP Report https://cer.org.za/wp-content/uploads/2018/05/ERC-Coal-IPP-Study-Report-Finalv2-290518.pdf.

50.2. Both pose unacceptable risks to South Africa's precious water resources – Thabametsi will be based in the water-scarce Waterberg, and Khanyisa (through probable leaching of toxic coal ash) will pose unacceptable risks of groundwater contamination and place the already highly-polluted Olifants River at risk of further contamination. A CSIR study on the Lower Olifants in 2014 found, *inter alia*, that the health risks predicted from the daily consumption of one litre of water in the Lower Olifants is anticipated to be in the order of 64 times that considered to be safe for a life-time exposure in South African study sites. In one South African study site, arsenic in water samples was found at levels considered to be responsible for a 1 in 1 000 chance of developing cancer based on the consumption of one litre of water per day. This is 100 times higher than the 1 in 100 000 acceptable risk recommended by the World Health Organisation (WHO).[63] Below, at paragraphs 101 to 105, we refer to research on the failure to adequately consider the high costs relating to usage and pollution of water in electricity planning.

50.3. Both projects will be based in air quality priority areas where health-based National Ambient Air Quality Standards (NAAQS) under the National Environmental Management: Air Quality Act, 2004 (AQA) are already being exceeded:[64] Thabametsi in the Waterberg-Bojanala Priority Area, and Khanyisa in the Highveld Priority Area (HPA). Thabametsi's own atmospheric impact report acknowledges (even based on incorrect calculations) that Thabametsi becoming operational will give rise to non-compliance with NAAQS for SO_2.[65] Allowing for further emissions in these areas – where air pollution is already dangerously high – even if the projects meet minimum emission standards, would pose unacceptable, and unlawful, risks to human health. In the HPA in particular, the addition of further polluting facilities will clearly exacerbate the dangerously-high levels of air pollution, and the attendant significant health impacts and violation of the section 24 environmental right in the Constitution.[66]

50.4. Quite apart from the significant cost to the State that arises from the health impacts of pollution – addressed from paragraph 119 below - these two projects will also cause severe economic and financial harm to Eskom, Treasury, municipalities, and – most importantly, electricity consumers.

51. We refer to a report recently published by the University of Cape Town's Energy Research Centre (ERC) entitled "*An assessment of new coal plants in South Africa's electricity future: the cost, emissions and supply security implications of the coal IPP programm*e" ("the ERC Coal IPP Report").[67] The ERC Coal IPP Report models several scenarios for an assessment of the effects of building the two coal IPPs, compared to a future electricity build plan that excludes them. The modelling investigates: supply security; the cost implications of the inclusion of the coal IPPs in the system relative to cheaper alternatives; the emission 'lock-in' from the plants; and the effects this has on South Africa meeting its long-term climate change commitments.

52. According to the report - and aligned with the draft IRP 2018 - since a least-cost electricity build plan for South Africa **does not include new coal plants**, in each scenario, the coal IPPs had to be forced into the model in order to compare the effects on the system.[68]

53. The ERC Coal IPP Report finds, *inter alia*:

53.1. the proposed Thabametsi and Khanyisa coal-fired power stations will cost South Africa an **additional R19.68 billion in comparison to a least-cost energy system**;[69]

[63] See https://cer.org.za/wp-content/uploads/2017/09/Annexure-J-Final_Report_Lower_Olifants_31March2014_FINAL.pdf.
[64] 2017 State of the Air Report, available at http://www.airqualitylekgotla.co.za/assets/2017_1.3-state-of-air-report-and-naqi.pdf.
[65] P59 – 60, Atmospheric Impact Report for Thabametsi, 31 July 2018.
[66] https://cer.org.za/programmes/pollution-climate-change/publications/broken-promises-the-failure-of-the-highveld-priority-area.
[67] Available at https://cer.org.za/wp-content/uploads/2018/05/ERC-Coal-IPP-Study-Report-Finalv2-290518.pdf.
[68] P9, ERC Coal IPP Report.
[69] P37, ERC Coal IPP Report.

53.2. the coal IPPs are not needed to meet South Africa's medium-term electricity demand, as alternate electricity sources i.e. wind, solar PV, and flexible gas[70] generation are more economical;

53.3. the coal IPPs' GHG emissions will be 205,7Mt CO2eq over the 30 year period of the power purchase agreements, which would effectively **negate the government's GHG emission mitigation plans and efforts**. Even in a best-case scenario for the coal IPPs (with GHG emissions curtailed as far as possible), the two coal IPPs would still frustrate South Africa's commitments under the Paris Agreement, through raising the costs of mitigation technologies and requiring significant GHG emission reductions in the power and other sectors (in which such reductions are more difficult and more expensive);[71] and

53.4. that, in relation to Eskom and electricity supply and costs,"*[n]ot only are the coal IPPs not required to meet demand, and not only do they raise costs, and increase emissions, but they also result in increasing pressure on Eskom**. Building new coal plants in a situation of low demand means reducing the output of Eskom's fleet, potentially accelerating the 'utility death spiral' in which Eskom already finds itself and putting the electricity supply industry – and thus the South African economy – at risk***" (emphasis added).[72] "*When the coal IPPs are forced into the electricity build plan, this results in **decreased use of existing coal plants** (which are also cheaper than the coal IPPs), which **puts raises (sic) costs overall and puts Eskom at risk***" (emphasis added)[73] and "*the implications of these findings are clear. South Africa is currently facing a large surplus in generation capacity, in particular inflexible base supply capacity. Eskom is facing a financial crisis and **rising electricity prices will drive consumers away from the utility. Investments that unnecessarily increase costs in the electricity sector should be avoided***" (emphasis added).[74]

54. By developing new and unnecessary coal infrastructure, the risk of stranded assets is also further increased. A global report coordinated by French energy think tank The Institute for Sustainable Development and International Relations (IDDRI) and Climate Strategies, to which South Africa's ERC was a contributor, titled "Implementing Coal Transitions: Insights from case studies of major coal-consuming economies" ("Coal Transitions Report")[75] looks at coal transition strategies around the world, including South Africa. The report shows that:

54.1. "*In South Africa … total electricity demand has been declining, **resulting in surplus capacity and leading to the likely stranding of recently built coal power plants**. In this context, the issue of how to transition from a coal-intensive to a low-carbon economy while ensuring a "just transition" is gathering attention*" (emphasis added);[76]

54.2. "*asset owners will tend to request compensation from taxpayers for closure decisions that are seen to relate to government. This may be true even where closure is likely based on economic grounds or where the existence of the climate policy "threat" could arguably have been identified and priced by investors well before the decision is made. While not necessarily justified, such claims can create a barrier to implementing a smooth transition. **Stranded assets are thus a potential problem of political economy that needs to be anticipated and avoided***" (emphasis added);[77]

[70] Battery storage or flexible demand response are also potential flexible generation sources, and alternatives to coal and gas. Both have a growing future potential to contribute to peak demand reductions and system services. This is addressed in further detail in the comments below.
[71] P37, ERC Coal IPP Report.
[72] P8, ERC Coal IPP Report.
[73] P17, ERC Coal IPP Report.
[74] P5, ERC Coal IPP Report.
[75] Available at https://coaltransitions.files.wordpress.com/2018/09/coal_synthesis_final.pdf.
[76] P17 – 18, Coal Transitions Report.
[77] P24 - 25, Coal Transitions Report.

54.3. "*The coal transition scenarios explored by the project suggest that the best way to manage stranded assets in the coal sector is first and foremost to avoid allowing coal-sector investors to support assets likely to be stranded.* ***Anticipation and avoidance is key****. Secondly, investors should generally be required to bear losses where it was possible to sufficiently anticipate risks*" (emphasis added);[78] and

54.4. "*In some scenarios, achieving 2°C-compatible coal transitions could require creating some stranded assets, even if the above policy recommendations were followed. In the South African or Indian scenarios, an assumed high growth in metallurgical and thermal coal use in industry* ***puts pressure on the power sector, which has to decarbonise at fast pace to remain within the carbon budget. In the South African scenario, all coal-fired power plants are phased out by 2040, resulting in a handful of units closing more than 10 years earlier than their expected financial lifetime***" (emphasis added).[79]

55. As alternative and feasible electricity sources, which are also cheaper than coal, exist, these infringements on the section 24 right, and other Constitutional rights, in addition to the negative socio-economic implications cannot be justified or accepted, nor could these projects be regarded as rational or reasonable measures. The justifications for including the coal IPPs in the draft IRP 2018, are in any event, unacceptable. This is addressed in more detail below.

56. It is also arguable that forcing new coal into the draft IRP 2018, whilst acknowledging that it does not form part of a least-cost plan, and with the numerous negative impacts, would be contrary to the requirements and objects of ERA; particularly the requirement that the IRP give effect to national policy and the object of ensuring that the interests and needs of present and future electricity customers and end users are safeguarded and met. It also directly contradicts the draft IRP 2018's own statement that the IRP be based on "*least-cost supply and demand balance*".[80]

<u>Justifications for new coal in the draft IRP</u>

57. The inclusion of unnecessary and harmful new coal-fired power stations in the draft IRP is made further unacceptable by the lack of any reasonable or lawful justification for these impacts.

58. The two justifications provided by the draft IRP 2018 for this policy adjustment are, as stated above:

58.1. that the projects are "*already procured and announced*"; and

58.2. that "*[j]obs created from the projects will go a long way towards minimizing the impact of job losses resulting from the decommissioning of Eskom coal power plants and will ensure continued utilisation of skills developed for the Medupi and Kusile projects*."

59. Apart from being incorrect, we record that neither justification is a reasonable or lawful basis on which to force the inclusion of new coal capacity in the IRP – particularly where the draft IRP 2018 itself acknowledges that a least-cost plan would not include **any** new coal capacity, and in light of the devastating impacts of burning coal for electricity. We address each justification in turn below.

i. Projects already committed and announced

[78] P25, Coal Transitions Report.
[79] P25 – 26, Coal Transitions Report.
[80] P14, draft IRP 2018.

60. Although announced preferred bidders in 2016,[81] the coal IPPs are far from reaching commercial or financial close, and they are certainly not committed or "procured". There is no guarantee that these projects will go ahead as:

    60.1. they have numerous required licences still outstanding and/or are subject to challenge;

    60.2. the environmental authorisations for both are subject to review proceedings in the Pretoria High Court;[82]

    60.3. the DoE and Eskom have yet to make the required decisions in terms of regulation 9(2) of the New Generation Regulations under ERA, before the power purchase agreements (PPA) can be signed;

    60.4. we understand that various Public Finance Management Act, 1999 (PFMA) approvals - particularly from Treasury and/or the Minister of Finance - are still outstanding;

    60.5. The financing for these projects has yet to be finalised – with Standard Bank reportedly recently advising the DoE of the bank's new policy position to stop funding the construction of any new coal-fired power plants, in line with new Organisation for Economic Co-operation and Development country protocols. Standard Bank is a proposed financier of both the coal IPPs, although it has not been confirmed whether the bank's new policy decision applies to the coal IPPs;[83] and

    60.6. the DoE is well within its rights and powers, in terms of the Request for Qualifications and Proposals for New Generation Capacity under the Coal Baseload IPP Procurement Programme ("RFP"), to abandon these projects.

61. In substantiation of the above, the RFP states the following:

    61.1. in order to reach commercial and financial close, a preferred bidder must: submit a project development plan to show milestones, including all necessary environmental consents obtained and all appeals or reviews of environmental consents settled;[84] and provide, at least one month before commercial close, a number of authorisations and records including an environmental authorisation, waste management licence (WML), water use licence (WUL), atmospheric emission licence (AEL), and a licence to generate electricity from NERSA; and prove to the DoE's satisfaction that all High Court review proceedings of the decisions to grant any environmental consents required for (the project) have been satisfactorily resolved;[85]

    61.2. "*[t]he **risk** of an appeal being lodged post announcement of preferred bidder or post commercial and financial close against any environmental consent **will be borne solely by the preferred bidder** or seller as the case may be … the **risk** of an environmental consent being overturned on review **will be borne solely by the preferred bidder** or seller as the case may be*" (emphasis added);[86]

[81] The Coal IPPs were announced preferred bidders under the first bid window of the Coal IPP Procurement Programme on 10 October 2016, see file:///C:/Users/nloser/Downloads/PressRelease-Coal-based-Independent-Power-Producer-programme-announcement-10Oct2016.pdf.

[82] The Thabametsi case court papers can be accessed here https://cer.org.za/programmes/pollution-climate-change/litigation/the-proposed-thabametsi-ipp-earthlife-africa-johannesburg-v-department-of-environmental-affairs-thabametsi-power-project-pty-ltd-and-others and the Khanyisa court papers can be accessed here https://cer.org.za/programmes/pollution-climate-change/litigation/groundwork-acwa-power.

[83] https://www.fin24.com/Economy/funding-of-two-new-coal-ipps-in-south-africa-may-be-under-threat-20180926.

[84] P13, clause 5.2, Vol2, Part 5: Preferred Bidder Documents, RFP.

[85] P17, clause 5.5.5, Vol2, Part 5: Preferred Bidder Documents, RFP. P99, 14.2, Part A, RFP.

[86] P99 – 100, 14.2, Part A, RFP.

61.3. if a preferred bidder default occurs,[87] the DoE shall be entitled to terminate the appointment of the bidder as a preferred bidder;[88]

61.4. "*the Department reserves the right to amend, modify or* ***withdraw this RFP or any part of it, or to terminate or amend any of the procedures, procurement processes or requirements detailed in this RFP during the conduct of the Coal Baseload IPP Procurement Programme, at any time without prior notice and without liability*** *to compensate or reimburse any person pursuant to such amendment, modification, withdrawal or termination*" (emphasis added);[89]

61.5. "*the Department* ***reserves the right to terminate or amend the Coal Baseload IPP Procurement Programme, at any time****, without prior notice and* ***without liability to compensate or reimburse any person*** *pursuant to such termination or amendment*" (emphasis added);[90] and

61.6. "*no bidder, its members, contractors, or its lenders shall have any claim against the Department …*".[91]

62. The coal IPPs are not capable of reaching commercial or financial close, as various approvals are still outstanding and/or subject to legal challenge:

62.1. Thabametsi has yet to obtain any of the following authorisations: an AEL (the application was only submitted in May 2018, with a revised application being published in August 2018, to which Earthlife Africa and groundWork objected); a WUL (the application was submitted in February 2018, to which Earthlife Africa and groundWork objected); and a NERSA generation licence (Earthlife Africa has also objected to this application).

62.2. Khanyisa has a provisional AEL (the transfer of which is subject to an appeal by groundWork) and a WUL (which is being appealed by groundWork and is currently suspended although ACWA Power has applied to the Minister of Water and Sanitation to lift the suspension of the WUL), but does not have a generation licence from NERSA (groundWork has objected to the generation licence application).

63. The environmental authorisations for both Thabametsi and Khanyisa – as set out above - are subject to ongoing review proceedings in the High Court.

64. We also record our instructions to challenge the granting of any other licences to these projects, and/or the dismissal of any of the licence appeals.

65. Furthermore, as stated above, there are various steps and approvals required by DoE, Treasury, and Eskom in terms of the New Generation Regulations, the PFMA, and the RFP **before** any PPAs for the coal IPPs could be signed.

66. In relation to the legal requirements for the signing of a PPA, regulation 9 of the New Generation Regulations states, *inter alia*, that:

> *"(1) A power purchase agreement between the buyer and an IPP must meet the following requirements – (a)* ***value for money****;*

[87] A "preferred bidder default" is defined in clause 2, volume 2 part 5 of RFP as "a breach of this undertaking as detailed in clause 9". Clause 10 of the RFP (volume 2 part) sets out Occurrence and Consequences of a Preferred Bidder Default. A default occurs if, for example, a preferred bidder fails to reach commercial close on the date specified in the project development plan (clause 10.1.5).
[88] P26, 10.2, vol2 part 5, RFP.
[89] P10, clause 1.3, Part A, RFP.
[90] P10, clause 1.4, Part A, RFP.
[91] P11, clause 1.8, Part A, RFP.

(b) appropriate technical, operational and financial risk transfer to the generator;
(c) effective mechanisms for implementation, management, enforcement and monitoring of the power purchase agreement; and
(d) satisfactory due diligence in respect of the buyer's representative and the proposed generator in relation to matters of their respective competence and capacity to enter into the power purchase agreement.

(2) Before the buyer concludes a power purchase agreement, the buyer ***or the procurer*** *[DoE]* ***must****, subject to any approvals required in terms of the PFMA (Public Finance Management Act, 1999) –*
(a) ***ensure that the power purchase agreement meets the requirements set out in sub-regulation (1)****;*
(b) ensure that the buyer has a contract management plan that explains the capacity of the buyer, and its proposed mechanisms and procedures, to effectively implement, manage, enforce, monitor and report on the power purchase agreement and any other agreements relating to a new generation capacity project to which the buyer is a party, to National Treasury and the Minister on a regular basis; and
(c) put in place arrangements to ensure that any portion of the buyer's allowable revenue approved or allocated by the Regulator for purposes of implementation of new generation capacity projects will be used solely for the purpose of ensuring that the buyer's financial obligations in respect of new generation capacity projects will be met" (emphasis added).

67. The New Generation Regulations define "value for money" as "*that the new generation capacity project results in a* ***net benefit to the prospective buyer or to Government*** *having regard to* ***cost, price, quality, quantity, risk transfer or a combination thereof, but also where applicable to the Government's policies in support of renewable energy****"* (emphasis added).

68. The RFP states that the "*outcome of the consideration as to whether or not a project delivers value for money, is required to produce an assessment that the project is in the* ***best interests of and delivers an acceptable outcome to the buyer (Eskom) and the Government acting on behalf of and in the best interests of the people of South Africa, including electricity users***" (emphasis added).[92]

69. We submit – and have advised the DoE and Eskom - that the coal IPPs would **not** meet the "value for money" criteria as defined in the New Generation Regulations because:

    69.1. they would not provide a net benefit to Eskom or government, and would certainly not meet the criteria of the definition of "value for money" in the New Generation Regulations; and

    69.2. they would not be in the best interests of Eskom or government, or in the best interests of the people of South Africa, as required by the RFP.

70. Energy Minister Jeff Radebe has himself confirmed to Parliament that electricity consumers will pay 1.9c/kWh more by 2030 on a projected electricity tariff of 119c/kWh to accommodate the two coal IPPs included in the draft IRP 2018 – a cumulative R23-billion.[93]

71. In response to a Parliamentary question regarding the IPPs, of June 2018, the Minister of Public Enterprises advised that:

    "***Eskom has not approved the signing of the coal independent power producers (IPPs) agreements. No approval nor instruction has been given by the Department of Public Enterprises to Eskom to sign such***

[92] P59, 6.1.8.2, Part A, RFP.
[93] In a Parliamentary oral reply of October 2018, the Minister advised that "*Based on assumptions made in the IRP, the combined effect of including coal and Inga as policy adjustment is about 1.9 cents per kilowatt hour on projected tariff of 119 cents per kilowatt hour*." See also http://m.engineeringnews.co.za/article/radebe-outlines-additional-cost-of-coal-ipps-to-consumers-2018-10-01/rep_id:4433.

agreements. Eskom understands that all future IPP programmes are on hold until such time as the Integrate Resource Plan (IRP) has been concluded*. Eskom provided these IPPs with budget quotations for connection to the grid as is required by the Eskom transmission license (sic), but* ***has made no other allowances for these IPPs in the Eskom production plans and price applications****.*

The impact of new capacity as well as the low greenhouse gas emissions scenario on the electricity system and the Eskom generators must be considered in the development of the IRP. The IRP also considers price impacts.

Eskom will provide comments on the IRP when it is given the opportunity to do so, and any impact on Eskom's generators, costs and prices to consumers will be addressed in these comments.

Government together with Eskom and other key stakeholders are in the process of evaluating the socio-economic costs of decommissioning of mines that have reached their end of life. A transitional plan will be developed that will support the integrated Resources Plan (IRP)" (emphasis added).

72. Eskom further advised, in a letter of 7 September 2018, that:

"*Nersa convened a public hearing on 27 March 2018 to consider the application by the said IPPs for generation licences. Eskom attended this meeting and* ***indicated that it has not agreed to sign the Power Purchase Agreements (PPAs) because it does not agree with certain terms and conditions in the proposed PPAs****. Eskom has not been notified of the outcome of this public hearing.*

With regard to any approvals/other actions advanced by Eskom at this stage, the two coal baseload IPPs have applied for budget quotes, which Eskom has provided because it is legally obliged to do so regarding access to the grid for customers and regulation thereof in terms of the Grid Code and Eskom's distribution and transmission licenses.

At this stage, ***regarding the "value-for-money assessment", required by regulation 9(1)(a), read with 9(2)(a) of the New Generation Regulations, Eskom has not received this assessment from the Department of Energy as the designated procurer****.*

Should Eskom at a future date decide to sign the PPAs, the requirements of the New Generation Regulations, PFMA approvals, as well as all the necessary contracts, governance and regulatory processes and approvals will be closed out by Eskom" (emphasis added).[94]

73. Evidently Eskom does not regard the coal IPPs as being in its best interests, nor have the necessary decisions been made by government or Eskom to commit to the coal IPPs.

74. Eskom's board has fiduciary duties - under section 50 of the PFMA - to exercise the duty of utmost care to ensure reasonable protection of the assets and records of Eskom and to act in the best interests of Eskom. The board is also obliged to seek to prevent any prejudice to the financial interests of the state. We submit that the signing of the PPAs would constitute a breach of those duties, particularly given the outstanding licences and approvals for the coal IPPs, and the fact that the coal IPPs do not satisfy the requirements of regulation 9(1), read with 9(2), of the New Generation Regulations.

75. To the extent that Eskom might assert that it does not have a choice as to whether to sign the PPAs, but is still of the view that the signing of the PPAs would be harmful to Eskom's interests, the implication is that the board is unable to comply with its fiduciary duties and responsibilities. As such, it is the board's obligation – under section

[94] See https://cer.org.za/wp-content/uploads/2018/09/Coal-baseload-Independent-Procedures-Status-of-the-Power-Purchase-Agre....pdf and https://cer.org.za/wp-content/uploads/2018/09/CER-Letter-to-Eskom_7-Aug-2018.pdf.

51(2) of the PFMA - to "*promptly report the inability, together with reasons, to the relevant executive authority and treasury*".

76. It is clear that many of the required steps and decisions that would precede the signing of the PPAs have not yet been taken and that **these projects are certainly not "procured", or in any event, committed. The DoE and Eskom are in no way legally bound to these projects, particularly not at this stage, despite the coal IPPs' status as preferred bidders. There can be no legitimate expectation, at this stage, that the coal IPPs will go ahead**.

77. As numerous licences and authorisations are outstanding and being contested (and will continue to be contested) – including in the High Court **- there is, in any event, no guarantee that these projects will receive all the necessary authorisations to go ahead. It would be irrational for the IRP to regard these projects as a foregone conclusion in circumstances where necessary licences might be refused and/or court challenges might be successful**.

78. The draft IRP 2018 states that "*[s]ince the promulgated IRP 2010-2030, the following capacity developments have taken place: A total 6422MW under the Renewable Energy Independent Power Producers Programme (REIPPP) has been procured, with 3272MW operational and made available to the grid. Under the Eskom build programme, the following capacity has been commissioned: 1332MW of Ingula pumped storage, 1588MW of Medupi, 800MW of Kusile and 100MW of Sere Wind Farm. Commissioning of the 1005MW Open Cycle Gas Turbine (OCGT) peaking plant. In total, 18000MW of new generation capacity has been committed to*."[95] The coal IPPs are not mentioned here. They are also not mentioned in section 3.3 of the draft IRP 2018 under "Installed and Committed Capacity". In Table 10 of the draft IRP 2018 it states, in relation to the Coal Determination that "*900MW procured No contracts signed*".[96] Although we dispute the correctness of the statement that 900MW is procured, this further substantiates the point that the coal IPPs are not, in any way, committed.

ii. Jobs and a smooth transition

79. The draft IRP 2018 seeks to justify the inclusion of the coal IPPs on the basis that the "*[j]obs created from the projects will go a long way towards minimizing the impact of job losses resulting from the decommissioning of Eskom coal power plants and will ensure continued utilisation of skills developed for the Medupi and Kusile projects*".

80. With respect, building and operating two expensive and unnecessary new coal plants, simply for the sake of providing jobs is a reckless "solution" to South Africa's unemployment problems. We do not dispute that unemployment is a serious issue in South Africa that needs to be addressed, or that there should indeed be concern around ensuring continued work for workers in the coal sector. The solution, however, certainly does not lie in the coal IPPs, particularly because these projects – through raising electricity costs and placing additional strain on Eskom, consumers and municipalities – will have severe negative impacts for the economy, in particular business and jobs. This is quite apart from their impacts on air quality, water, soil, and climate.

81. The Coal Transitions Report, referred to above, makes clear that a coal transition is inevitable and has been underway in South Africa and globally for some time already. In other words, it is no longer a question of "if" South Africa phases out of coal, but "when". There will be further job losses unless government puts in place credible, well-communicated and expertly-executed plans to support workers and diversify the economy towards labour-intensive sectors.

82. The Coal Transitions Report highlights the benefit of taking steps now rather than later, in order for a transition to be just and inclusive: it states that "*early anticipation and preparation of the transition is vital to achieve the best results*".[97] Importantly, the report finds that:

[95] P15, draft IRP 2018.
[96] P60, draft IRP 2018.
[97] P6, Coal Transitions Report.

82.1. coal transitions are affordable for energy consumers because the transition away from coal is now the least-cost option for South Africa;[98]

82.2. "*universal electricity access – and economic growth – can be ensured in … developing countries (i.e. South Africa and India) while also phasing down thermal coal in the power sector …* ***Universal electricity access to consumers can … be provided more cheaply and reliably without coal***" (emphasis added);[99]

82.3. coal transitions can strengthen global climate action and deliver other social and economic objectives – for example "*in South Africa, diversification from coal in the power sector would help reduce the cost of supplying electricity, while limiting the risk of cross-subsidisation of the power sector by the coal export sector*";[100]

82.4. a "*just transition for workers is not an abstract or utopian concept. Rather, it is something that can be implemented, that has been implemented and that is being implemented in some places around the world today. Examples include the Netherlands (Limburg in the 1960s), Canada (Alberta today), Germany (Ruhr in the 1960s and today), and, to some extent, Australia (CFMEU, 2017)*";[101]

82.5. governments should look to finance the transition, for example by establishing just transition funds into which companies pay and/or ensuring companies have adequate financial resources to pay for the transition of their labour force;[102] and

82.6. "***pitfalls from past transitions include a propensity to "lock-in" to the incumbent industry to block the arrival of economic diversification. This can often lead to actors trying to "hang on" to a dying industry, neglecting the future only to finally start economic diversification too late*** *… structural economic change still takes significant time, resources, and a process of trial and error****. Beginning the process of economic diversification is therefore a matter of urgency for all coal-and fossil-fuel intensive regions that wish to survive and provide equivalent or better economic opportunities for the next generations***" (emphasis added).[103]

83. In short, what this report makes clear is that building new coal plants, **locking South Africa into expensive, unnecessary and outdated infrastructure is the worst thing that South Africa could do, including for coal workers and the unemployed. Rather than subsidise the coal industry, support should go to the workers directly; including in efforts to retrain and reskill coal workers**.

84. The Coal Transitions Report makes various recommendations for just transition processes for workers in the coal sector, such as "*managing the progressive reduction in the size of the workforce in coal-related activities and the transition of workers to alternative activities*"; "*[e]stablishing integrated multi-purpose retraining programmes for specific subsets of workers*" and "*[r]equiring companies to develop asset closure and labour management plans in consultation with labour, regional governments and citizens*."[104]

85. It is government's obligation to ensure that better and more sensible measures for a transition are implemented, and that this **process is put into motion on an urgent basis**. We need clear policies and a credible, well-communicated, and expertly-executed plan with timeframes and adequate resources to accommodate people who would lose their jobs when power stations and mines close. This process must be in accordance with the

[98] P23 Coal Transitions Report.
[99] P23, Coal Transitions Report.
[100] P7, Coal Transitions Report.
[101] P27, Coal Transitions Report.
[102] P30, Coal Transitions Report.
[103] P32, Coal Transitions Report.
[104] P28 - 29, Coal Transitions Report.

Constitution, and it must be transparent, informed by meaningful consultation, and administered through democratic governance.

86. The Life After Coal Campaign advocates for a vibrant renewable energy industry in South Africa, that is structured to absorb and re-skill coal workers, and that includes community and public ownership and benefits. In addition to the Renewable IPP Programme, the barriers to small-scale, community-based renewable energy investments must be removed to encourage and enable a just transition to renewable energy for the people.

87. Although it is difficult to project exact numbers, it is also clear that renewable energy has considerable job creation potential in South Africa. "*For a generic comparison, an analysis is required of the job-years involved in installing and operating the different generation technologies, relative to the size and electricity output of the respective plan*t" states a book titled "South Africa's Energy Transition",[105] which explains the significant job potential of renewable energy in South Africa. It explains that "***South Africa is in a strong position to decarbonise its energy mix cost effectively and without undermining security of supply, jobs or the economy. In fact, this decarbonised platform will be cheaper than any other mix currently being contemplated****. Because South Africa has better solar and wind resources than just about any other country, its power will be comparatively cheaper … Building and* ***operating an electricity system based on solar, wind and flexible generation technologies will create more jobs than any of the alternatives****. South Africa is extremely well positioned to pursue an 'electrification-of-almost-everything' future, where the decarbonised electricity system powers a competitive industrial economy, drives an electric-mobility revolution and creates new export and investment opportunities*" (emphasis added).[106]

88. Existing and potential jobs in the renewable energy sector should be recognised and supported; including those created and to be created through the Renewable IPP Programme.[107] In fact, the DoE's own study[108] finds that 30% more permanent direct jobs per unit of energy are created with the renewable energy mix than with coal.[109] Modelling done by CSIR highlights that a decarbonised scenario (95% decarbonisation by 2050) would create the most jobs, with between 112 000 - 144 000 jobs by 2030, reaching up to 331 000 by 2050.[110]

89. The research shows that solar PV and wind are more job-intensive along the entire value chain than coal-fired power stations. These are also likely to be more resilient than coal jobs - which will become increasingly vulnerable in a world on the decarbonisation path. Furthermore, the legally-required decommissioning of Eskom's power plants and rehabilitation of coal mines and land impacted by coal mining, would result in extensive employment opportunities, particularly for ex-mine and power station workers.

90. In conclusion regarding our objection to the provision of new coal capacity in the draft IRP 2018, we emphasise that any provision for new coal would not be a reasonable measure in terms of section 24 of the Constitution, because:

    90.1. coal-fired power stations have significant negative impacts on human health, water, climate and the environment more generally – these particular coal IPP plants will also have very negative cost and socio-economic implications; and

    90.2. there is no need for additional coal-based electricity, particularly given: lower demand and surplus base capacity; renewable energy potential; energy efficiency and storage technologies.

[105] By Tobias Bischof-Niemz and Terence Creamer.
[106] P152, Chapter 7, South Africa's Energy Transition.
[107] IRENA (2018). *Renewable Energy and Jobs. Annual Review 2018.*
[108] A study on jobs in relation to the IEP - DoE IEP Annexure B: Macroeconomic Assumptions.
[109] P138, Chapter 7, South Africa's Energy Transition.
[110] Council for Scientific and Industrial Research (CSIR). 2017. *Formal comments on the Integrated Resource Plan (IRP) Updates Assumptions, Base Case and Observations*. Pretoria: CSIR. Available at https://www.csir.co.za/sites/default/files/Documents/20170331CSIR_EC_DOE.pdf.

The annual constraint placed on renewable energy capacity up until 2030

91. The draft IRP 2018 states "*the scenario without RE [renewable energy] annual build limits provides the least-cost option by 2030".*[111]

92. Yet the policy-adjusted draft IRP 2018 includes annual build limits for new renewable capacity, calling for "*[a] least-cost plan with the retention of annual build limits (1000MW for PV and 1600MW for wind) for the period up to 2030. This provides for smooth roll out of RE, which will help sustain the industry*."[112]

93. It also states, in apparent contradiction, that "*[i]mposing annual build limits on RE will not affect the total cumulative installed capacity and the energy mix for the period up to 2030*"[113] and that "*[i]mposing annual build limits does not disadvantage renewables for the period ending 2030. It can therefore be concluded that varying input assumptions do not materially alter the energy mix for this period*."[114]

94. We submit that the inclusion of this constraint in the policy-adjusted IRP is arbitrary and unreasonable, and the justifications provided are unacceptable, contradictory and do not make sense.

    94.1. If imposing annual build limits does not affect or disadvantage renewables, or materially alter the energy mix (which we dispute), why has the constraint been imposed? In other words, if it makes no difference – as the DoE alleges – why include it?

    94.2. If the scenario without annual build limits on renewable energy provides the least-cost option, surely then imposing the build limits does negatively affect and disadvantage renewables and the IRP as a whole, and does alter the energy mix. By 2030, the scenario without build limits is already shown to have a distinct energy mix (with a very different outcome), and lower costs, compared to the Recommended Plan. We also reiterate that an unconstrained renewable/least-cost scenario would not include any new coal, and refer to our submissions above in this regard.

    94.3. It is also not clear how the annual build limits would provide for "*smooth roll out*" of renewable energy or "*help sustain the industry*" – this would need to be explained more fully; but, in any event, we do not agree or accept this as an adequate justification for the annual build limit on renewable capacity.

    94.4. The draft IRP 2018 anticipates a "*significant change in the energy mix post 2030*" drawing a distinction between the pre-2030 and post-2030 circumstances and plans. It is however, not clear why, in the case of renewable capacity, a distinction is drawn between the period before 2030 and after 2030. The draft IRP 2018 alleges that post 2030, unconstrained renewables are the best option, but not pre-2030. Why should the least-cost option of unconstrained renewables be followed after 2030, but not before? This is not logical and cannot be supported.

95. Build limits can be reasonable elements of an IRP analysis when used to simulate real-world constraints on annual build-out timelines and quantities. However, build limits need to be transparently developed and supported by resource potential studies, market data, and additional details on how the government anticipates these factors changing over time. **The draft IRP 2018 provides no studies or analyses to support its enforced build limits**. Such build limits are of particular concern when coupled with conservative cost decline assumptions. These cost assumptions can make renewables appear uneconomic in the short term, even though this is not the case in reality. This would delay renewable builds until the later years, at which point the renewable projects run up against the arbitrary build limits.

[111] P34, draft IRP 2018.
[112] P39, draft IRP 2018.
[113] P34, draft IRP 2018.
[114] P49, draft IRP 2018.

96. In brief, the draft IRP 2018 provides no acceptable rationale for restraining renewable energy capacity. We submit that, on the contrary, the constraint appears to unreasonably hold back and deter the cheapest and least harmful energy sources, in order to make way for costly, harmful, and unnecessary electricity sources such as coal.

97. We emphasise that the annual constraint on renewable capacity to the year 2030 is arbitrary, irrational, and certainly not a reasonable measure to give effect to section 24 of the Constitution.

Failure to consider externalities and impacts

98. Above, where we refer to the obligations of NEMA, we point out that the IRP should include a study of the environmental impacts of the proposed electricity choices. It is fundamental that, in addition to simply assessing the external costs of various electricity sources, consideration also be given to **the actual impacts and implications of different sources and technologies for South Africa's water resources; human health; air; ecosystems; and climate**. This is particularly true in light of the draft IRP 2018's own stated objective of "*taking into account the environment*". This must be addressed in the final IRP.

99. We are concerned that the only externalities considered in the draft IRP 2018 are "*the negative externalities-related air pollution caused by pollutants such as nitrogen oxide (NOx), sulphur oxide (SOx), particulate matter (PM) and mercury (Hg*)", stating further that "*[t]hese externality costs reflect the cost to society because of the activities of a third party resulting in social, health, environmental, degradation or other costs*."[115]

100. While we agree that the externalities of air pollutant emissions are certainly important and must be considered in the IRP, we point out that this is still far too narrow, as other important external costs, such as the costs of various electricity sources for water, ecosystems, and in relation to climate change have not been considered at all in the draft IRP 2018. The pollution and use of limited water resources, and the degradation of ecosystems and exacerbation of climate change impacts as a result of electricity production also result in social, health, and environmental degradation costs – which must therefore be considered in the IRP. We address below in more detail the missing water, climate change and ecosystem externalities.

Missing externalities and impact assessments

i. Water

101. A report, titled "Water Impacts and Externalities of Coal Power"[116] ("Water Externalities Report"),[117] looks at the broad range of water impacts and externalities linked to the coal sector, which are currently not accounted for in electricity planning. The report highlights the need for the final IRP to consider a range of water-related externalities and impacts in determining and costing South Africa's future electricity supply mix.

102. **As a water-scarce country, it is imperative that electricity planning gives proper and full consideration to the sector's impacts on South Africa's water resources**. As set out in the Water Externalities Report,[118] some of the critical factors around water impacts and externalities that are currently not considered in electricity planning include the following:

102.1. Coal power generation requires **significant volumes of water** - coal mining and power generation together consume 5% of South Africa's water. At local level in the Upper Olifants Catchment, power generation accounts for 37% of water use. Estimates of water consumption for various technologies for power generation have been summarised by Inglesi-Lotz and Blignaut in their 2012 study titled "Estimating the

[115] P25, draft IRP 2018.
[116] Available at https://cer.org.za/wp-content/uploads/2018/07/Water-Impacts-and-Externalities-Report_LAC.pdf.
[117] Available at https://cer.org.za/wp-content/uploads/2018/07/Water-Impacts-and-Externalities-Report_LAC.pdf.
[118] Available at https://cer.org.za/wp-content/uploads/2018/07/Water-Impacts-and-Externalities-Report_LAC.pdf.

opportunity cost of water for the Kusile and Medupi coal-fired electricity power plants in South Africa",[119] also referred to above in relation to the objectionable commitments to new capacity from Kusile and Medupi. They highlight that coal-fired power generation using dry cooling processes with flue gas desulphurisation (FGD) uses significant volumes of water (0.66 m^3/ MWh) compared to concentrated solar power (CSP) (0.296 m^3/MWh), solar PV (0.098 m^3/MWh) and wind (only 0.0038 m^3/MWh). They estimate that using dry-cooled coal-fired power generation with FGD, instead of CSP, results in forgone revenue due to water consumption of R0.83 for every kWh of electricity sent out (ZAR 2011). This translates to annual forgone revenue of R26.7 billion due to water requirements of Kusile compared to CSP. According to Eskom, meeting 2020 "new plant" minimum emission standards will "*require an additional 67 million cubic metres of water per annum by 2025, a 20% increase*".[120]

102.2. **Water for power generation in South Africa is under-valued** – a Greenpeace study[121] found that the opportunity cost (or scarcity value) of the water used for Kusile power station alone will be between **R6 billion and R12 billion each year**, and the damage cost imposed on other water users from sulphate pollution will be between R4.5 million and R7.7 million annually. The **electricity sector pays far less for water (approximately R3.40/m^3) than the average household (approximately R8/m^3)**. This means **there is no incentive to prioritise water-efficient supply options**.

102.3. Mining and burning coal **impacts on, and pollutes, our scarce water resources** – through acid mine drainage and leaching of toxic contaminants from coal ash storage into groundwater, for example. A number of studies attempt to quantify water treatment costs associated with coal-fired power. It has been estimated that the cost of acid mine drainage could be as high as R0.38/kWh (2009 ZAR).[122] The **capital and operational costs to treat mine water are considerable** - South Africa has close to **6 000 recorded derelict and ownerless mines**. It is estimated that the closure of these mines, including long-term treatment of acid-mine drainage, would cost up to **R60 billion**.[123]

102.4. A decarbonised future not only has far lower water consumption, but also costs less and creates more jobs. Research by CSIR,[124] in relation to the draft IRP 2016, highlights that a **decarbonised energy future would require 30% less water and create 5% more jobs by 2050**, than a Base Case that relies heavily on coal.[125]

102.5. Coal power disproportionately negatively affects marginalised communities located around coal mines and power stations; exacerbating environmental injustice

103. The Water Externalities Report states that:

[119] Inglesi-Lotz, R. and Blignaut, J. 2012. Estimating the opportunity cost of water for the Kusile and Medupi coal-fired electricity power plants in South Africa. Journal of Energy in Southern Africa. 23(4): 76-84.
[120] Savides, M. 2018. "Eskom says it can meet stricter pollution targets, but it will cost South Africans." Business Day. 12 July 2018. Available at: https://www.businesslive.co.za/bd/companies/energy/2018-07-12-eskom-says-itcan-%20meet-stricter-pollution-targets-but-it-will-cost-south-africans/
[121] Greenpeace, 2011. The True Cost of Coal in South Africa: Paying the price of coal addiction. Available: http://www.greenpeace.org/africa/Global/africa/publications/coal/TrueCostOfCoal.pdf.
[122] Pretorius, K. (2009). Coal Mining and Combustion - Internalising the cost for a fair climate change debate. Rivonia: Federation for a Sustainable Environment.
[123] WWF-SA. 2011. Coal and Water Futures in South Africa The case for protecting headwaters in the Enkangala grasslands.
[124] Council for Scientific and Industrial Research (CSIR). 2017. Formal comments on the Integrated Resource Plan (IRP) Updates Assumptions, Base Case and Observations. Pretoria: CSIR. At https://www.csir.co.za/sites/default/files/Documents/20170331CSIR_EC_DOE.pdf.
[125] Pii, CSIR Formal Comments on draft IRP 2016, at https://www.csir.co.za/sites/default/files/Documents/20170331CSIR_EC_DOE.pdf.

"*in light of the above, it is imperative that the final Integrated Resource Plan for Electricity considers a range of water-related externalities and impacts in determining and costing South Africa's future electricity supply mix. Such considerations include:*

- *Water use, across the full life-cycle of coal, with consideration of regional water availability*
- *Water infrastructure and management costs for different supply options*
- *Appropriate valuation of water for generation to ensure water efficiency is considered in supply options*
- *Water treatment costs, including capital and operation costs, for different supply options, with appropriate consideration of the long-term treatment requirements for acid-mine drainage*
- *The impact of different options on water quality and our water resources*
- *The downstream impacts of acid mine drainage*
- *Impacts on critical water resources such as our strategic water source areas*
- *Impacts due to the deposition of air pollutants on our water resources*
- *Water-related climate change externalities*
- *The knock-on effects of degradation of our water resources (especially acid-mine drainage) on ecosystems, crop production, health, and livelihoods of those reliant on the water*
- *Environmental justice in view of disproportionate negative effects of externalities on marginalised communities*".[126]

104. A study undertaken by the World Bank in partnership with the ERC sought to account for water constraints in energy planning tools. The study finds that *"not including water costs in the energy model increases the cumulative water consumption for the power sector by 77% and the whole energy system by 58%*". Conversely, incorporating water supply and infrastructure costs into energy modelling may result in a 75% reduction in water intensity of the power sector by 2050 compared to a 'no water cost' scenario.[127]

105. The current draft IRP 2018 does not consider any of the above factors relating to water externalities. This must be addressed.

ii. Climate change

106. The climate change impacts and costs of electricity sources for the climate, have also been left out. We note that the draft IRP 2018 states that "*[t]he costs associated with carbon dioxide (CO2) are not included as the CO2 emissions constraint imposed during the technical modelling indirectly imposes the costs to CO2 from electricity generation*."[128]

107. We submit that the costs associated with the emissions constraint are very different from the external costs of climate change. This would include costs resulting, and arising, from climate-damaging activities such as GHG emissions from each electricity source, destruction of carbon sinks, and exacerbation of South Africa's vulnerability to climate change impacts. The impacts include water scarcity, extreme weather events and temperature increases – all of which have very high associated costs, which cannot simply be disregarded in electricity planning.

108. There are established, universal models for calculating the social cost of climate change impacts. For example, the Interagency Working Group on the Social Cost of Greenhouse Gases ("IWG") in the United States (US) looks at global amounts in scope and applicability, representing the costs of global (and not US-specific) impacts.[129] As

[126] P3, Water Impacts and Externalities of Coal Power, available at https://cer.org.za/wp-content/uploads/2018/07/Water-Impacts-and-Externalities-Report_LAC.pdf.

[127] World Bank. 2017. Modelling the water-energy nexus: How do water constraints affect energy planning in South Africa? Washington D.C: World Bank Group. Available at http://documents.worldbank.org/curated/en/706861489168821945/pdf/113464-REVISED-W16014-eBook.pdf.

[128] P25, draft IRP 2018.

[129] The social cost of carbon, as determined by the IWG, is a consensus of the estimate of the social cost of carbon as calculated by three proprietary models: FUND, DICE, and PAGE, as described in the Technical Support Document available at https://www.epa.gov/sites/production/files/2016-12/documents/scc_tsd_2010.pdf (p5).

research progresses, a better understanding of the full extent of climate impacts is developing, and these costs are **increasing**. To further illustrate this point:

108.1. The IWG August 2016 Technical Support Document estimates the social cost of carbon for the years 2010 through 2050, (in 2007 US dollars per metric ton of CO_2).[130] The IWG defines the social cost of carbon as "*the monetized damages associated with an incremental increase in carbon emissions in a given year. It is intended to include (but is not limited to) changes in net agricultural productivity, human health, property damages from increased flood risk, and the value of ecosystem services due to climate change."*[131]

108.2. When the IWG monetised damages associated with an incremental increase in CO_2e emissions, it assumed that such damages, although costly, would not result in significant changes to domestic or global Gross Domestic Product (GDP). Experts now believe that damages associated with CO2e emissions do, in fact, depress domestic or global GDP, especially in poorer countries, substantially elevating the social cost of carbon. According to experts at Stanford University: "*Damages from climate change that directly affect growth rates have the potential to markedly increase the SCC (social cost of carbon) because each temperature shock has a persistent effect that permanently lowers GDP below what it would otherwise be … Continued warming therefore has a compounding effect over time, so that even very small growth effects result in much larger impacts than the traditional damage formulation…. Examples of pathways by which temperature could affect the growth rate of GDP include damage to capital stocks from extreme events, reductions in TFP (total factor productivity) because of a change in the environment that investments were originally designed for, or slower growth in TFP because of the diversion of resources away from research and development and towards climate threats. Empirical evidence that these impacts exist is mounting*."[132]

108.3. Experts in the US are now of the view that even the IWG figures do not accurately account for the true social costs of GHG emissions – as they fail to consider additional factors such as climate damages on long-term GDP (as indicated above); the effect of emissions on ocean acidification and warming;[133] or the thawing of permafrost.[134] In other words, the true social costs of GHG emissions are significantly higher than initially estimated.

109. The Synapse Report states that "*[t]he U.S. government calculated the social cost of carbon to be roughly $40 per ton in 2016.62 A National Bureau of Economic Research survey found that experts think the social cost of carbon is between $150 and $300 per metric ton. The Department should consider choosing a well-documented social cost of carbon and including it in its IRP modeling."*[135]

110. There is no legitimate reason why a value cannot be attributed to the GHG emissions that will come from each electricity source considered in the draft IRP 2018 - particularly given the high costs of these impacts, and the fact that the costs of adaptation and building resilience to climate change will ultimately have to be borne by the state and personally by the individuals impacted.

"*We rely on three integrated assessment models (IAMs) commonly used to estimate the SCC: the FUND, DICE, and PAGE models. These models are frequently cited in the peer-reviewed literature and used in the IPCC assessment. Each model is given equal weight in the SCC values developed through this process, bearing in mind their different limitations*."

[130] P4, available at https://www.epa.gov/sites/production/files/2016-12/documents/sc_co2_tsd_august_2016.pdf. Table ES-1 represents 4 possible values with different discount rates. The 3% discount rate is accepted as the average cost but recommends that all 4 be considered.

[131] IWG (August 2016) Technical Support Document: Technical Update of the Social Cost of Carbon for Regulatory Impact Analysis Under Executive Order 12866.

[132] P127 - 131, F.C Moore & D.B Diaz, "Temperature impacts on economic growth warrant stringent mitigation policy", *Nature Climate Change,* Volume 5, 2015.

[133] See Talberth, John, and Ernie Niemi. (2017) "Ocean Acidification and Warming: The economic toll and implications for the social cost of carbon."

[134] See González-Eguino, M., & Neumann, M. B. (2016). Significant implications of permafrost thawing for climate change control. Climatic Change, 136(2), 381-388.

[135] P17, Synapse Report.

111. Blignaut (2012)[136] estimates the global damage cost of coal-fired power generation for Kusile and Medupi, based on their expected CO_2 emissions. The global damage cost of these power stations was calculated by multiplying the expected annual CO_2 emissions by a range of social damage costs (R/tCO_2), which were estimated based on a review of various studies. The study estimates that the combined total global damage cost due to the expected CO_2 emissions from Medupi and Kusile (in ZAR 2010 terms) is likely to be between **R6.3-R10.7 billion each year**, based on a range of social damage cost estimates.

112. We also point out that CO_2 emissions are not the only GHG emissions that should be considered when assessing climate impacts and externalities, as CH_4 (methane) and nitrous oxide (N_2O) for example – particularly in the case of the coal IPPs, which will have very high N_2O emissions – are also relevant GHG emissions, that must be taken into account in electricity planning. In this regard, we reiterate that the coal IPPs will be amongst the highest GHG-emission-intensive plants in the world, and certainly in South Africa.

113. Nkambule and Blignaut (2012) estimate the global damage cost due to the mining and transportation of the coal required by Kusile.[137] Their findings suggest that the global damage cost due to the mining and transportation of the coal required by Kusile will most likely be between the range **of R479 million and R776 million** (assuming a mean CH_4 release rate) **and R888 million and R1 438 million per year** (assuming a high CH_4 release rate). More than 99% of this cost is due to the anticipated CH_4 releases during coal mining, with the remainder due to the CO_2, N_2O, and CH_4 emissions to be released during the transportation of the coal to Kusile.

iii. Ecosystem impacts

114. The ERC highlights that externalities related to biodiversity loss from coal mining and transport amount to around 0.7 cents/kWh.[138]

115. The specific external costs related to ecosystem services, attributed to specific power stations, will vary depending on the location of coal mines and associated land use and ecosystem features. For example, research by Blignaut et al. (2010) highlights that the main land use activities at the New Largo Colliery, intended to supply Kusile power station, include maize cultivation and grazing. Coal mining in the area will result in loss of farmland and grassland – as such the opportunity costs of coal mining are the forgone benefits that would be derived from agricultural production and ecosystem services generated by grasslands (such as carbon storage and sequestration potential of the soil and the vegetation cover). They thus estimate that the ecosystem service externality (lost agricultural potential and carbon sequestration) in relation to Kusile/New Largo Colliery, amounted to R77.4 million.[139]

116. Evidently there is a large gap of significant costs missing from the draft IRP 2018. These costs cannot simply be disregarded, particularly if the IRP is to fairly and accurately compare costs of various electricity sources. This **must**

[136] Blignaut, J. 2012. Climate change: The opportunity cost of Medupi and Kusile power stations. *Journal of Energy in Southern Africa*. 23(4):67-75. Available at http://www.scielo.org.za/pdf/jesa/v23n4/07.pdf.

[137] Nkambule, N. and Blignaut, J. (2012). "The external costs of coal mining: the case of collieries supplying Kusile power station". Journal of Energy in Southern Africa. 23(4) 85-93. Nkambule and Blignaut utilised data by Lloyd and Cook (2005) to estimate the amount of methane that will be released during mining (26,962 - 350 506 t/yr), which they converted to an equivalent release of CO_2 and multiplied by a range of social damage costs, as per the methodology used to calculate the global damage cost due to coal power generation. They further estimated the CO_2, N_2O, and methane (CH_4) emissions due to the transportation of coal via road, assuming 7 751 935 litres of diesel will be consumed each year.

[138] Edkins et al, 2010 "External cost of electricity generation: Contribution to the Integrated Resource Plan 2 for Electricity" available at https://www.researchgate.net/profile/Harald_Winkler/publication/267919472_External_cost_of_electricity_generation_Contribution_to_the_Integrated_Resource_Plan_2_for_Electricity/links/54d501380cf25013d02a54f2/External-cost-of-electricity-generation-Contribution-to-the-Integrated-Resource-Plan-2-for-Electricity.pdf?origin=publication_detail.

[139] Business Enterprises, University of Pretoria. 2011. "The external cost of coal-fired power generation: the case of Kusile". Report prepared for Greenpeace Africa and Greenpeace International. Pretoria: Business Enterprises, University of Pretoria. Available at https://repository.up.ac.za/bitstream/handle/2263/21839/Blignaut_External_2013.pdf?sequence=1&isAllowed=y.

be addressed in the final IRP. **The final IRP must also properly and comprehensively assess the impacts of the various electricity sources for human health, the environment including water, and the climate.**

Externalities understated in the draft IRP 2018

117. We also object to the manner in which the emissions (health) externalities in the draft IRP 2018 have been calculated and to the limited number of pollutants considered, which speaks to the general failure to consider health impacts in electricity planning. Pollutants such as ozone (O_3), nitrogen dioxide (NO_2), SO_2, carbon monoxide (CO), benzene (C6H6) and lead (Pb) also pose significant harm to human health and bring about external costs. These impacts and costs should also have been considered in the draft IRP 2018.

118. The pollutants NO_2, O_3 and SO_2 are also monitored by South Africa's health-based NAAQS. These substances, or mixtures of substances, were selected precisely because of their significant impact on human health, severally and collectively. However, we highlight that South Africa's NAAQS,[140] declared in 2009 and 2012 (for fine $PM_{2.5}$) are significantly weaker than those set out in the WHO's 2005 Guidelines [141] (which themselves are significantly out of date and currently being reviewed).

119. We are also concerned that the figures provided in the draft IRP 2018 appear to be significantly understated. Of particular concern are the health impacts of PM. The abovementioned 2016 study by Dr Mike Holland found the total annual costs of just $PM_{2.5}$ emissions from Eskom's coal-fired power stations to be USD 2 372.78 million (approximately R35 billion in current terms).[142] There are two crucially important considerations in this regard, that do not appear to be factored into the draft IRP 2018:

    119.1. In adopting the $PM_{2.5}$ standard in 2012, the then Minister of Environmental Affairs confirmed the WHO evidence that there are no safe levels of exposure to fine $PM_{2.5.}$ (the same is true of PM_{10}). In other words, even if compliance with $PM_{2.5}$ standard were achieved in South Africa – which is currently not the case based on government's own reports[143] - citizens would continue to be exposed to dangerous (potentially fatal) levels of $PM_{2.5}$; and

    119.2. $PM_{2.5}$ is both a primary and secondary pollutant – meaning that in certain atmospheric conditions, the reaction of SO_2 and NOx can form $PM_{2.5}$, also contributing to the total ambient $PM_{2.5}$. To put this in context, the source apportionment study in the Air Quality Management Plan (AQMP) for the Highveld Priority Area (HPA), published in 2012 following the HPA declaration in 2007,[144] confirms that power generation accounts for 73% of SO_2 emissions and 82% of NOx emissions. Even if only a portion of these percentages convert to secondary $PM_{2.5}$, it provides an indication of the magnitude of the contribution of coal-fired power generation to the ambient air pollution – and significant health impacts - in the HPA.

120. With the above in mind, these severe impacts and costs need to be properly reflected and accounted for in the IRP. Proper, comprehensive electricity planning, needs to give consideration to the **full** impacts and costs of the electricity sources in the plan. The costs allocated to emissions in Table 3, appear to be significantly understated.

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[140] We refer to Appendix 1 to the HPA AQMP, which provides a useful overview of the NAAQS pollutants and their respective health and environmental impacts. Available at http://www.saaqis.org.za/documents/HIGHVELD%20PRIORITY%20AREA%20AQMP.pdf at page 142.

[141] WHO Air quality guidelines for particulate matter, ozone, nitrogen dioxide and sulfur dioxide Global update 2005 at p9, available at: http://apps.who.int/iris/bitstream/handle/10665/69477/WHO_SDE_PHE_OEH_06.02_eng.pdf;jsessionid=0EE7C1034DDFBFA33093015019A00B41?sequence=1.

[142] P15 at https://lifeaftercoal.org.za/wp-content/uploads/2017/04/Annexure-A4.pdf.

[143] See the 2017 State of the Air Report, available at http://www.airqualitylekgotla.co.za/assets/2017_1.3-state-of-air-report-and-naqi.pdf.

[144] GN 1123, of 23 November 2007, available at http://www.airqualitylekgotla.co.za/assets/2017_1.3-state-of-air-report-and-naqi.pdf.

Furthermore, it is not clear what these figures are based on or how they have been calculated (no substantiating report or information appears to have been provided by DoE), this must be clarified.

121. Further, it appears that the emission externality unit and figure for mercury (Hg) in Table 3 are patently incorrect. It should be Rand per kilogram, to be consistent with the other pollutants, and the figure also appears to be incorrect. This must be corrected.

122. The following NEM principles under section 2 of NEMA would also require that full consideration be given to water, climate, and health externalities in the IRP:

    122.1. the principle of environmental justice,[145] since those most impacted are usually the poor and most disadvantaged members of society; and

    122.2. the principle that the costs of remedying pollution, environmental degradation and consequent adverse health effects and of preventing, controlling or minimising further pollution, environmental damage or adverse health effects must be paid for by those responsible for harming the environment.[146]

123. Furthermore, the ERA and Energy White Paper objectives of safeguarding the needs of electricity consumers,[147] and encouraging energy prices to be as cost-reflective as possible - including quantifiable externalities, would require that proper and full consideration be given to the above externality issues.

The urgent need to transition from fossil fuels in the electricity sector

124. The draft IRP 2018 fails to emphasise, or even acknowledge, the **severe threat posed by climate change** and the urgent need to phase out of South Africa's dependence on fossil fuels in the electricity sector.

125. The Climate Change Response White Paper, referred to above, states that:

> "*even under emission scenarios that are more conservative than current international emission trends, it has been predicted that by mid-century the South African coast will warm by around 1 to 2°C and the interior by around 2 to 3°C. By 2100, warming is projected to reach around 3 to 4°C along the coast, and 6 to 7°C in the interior. With such temperature increases, life as we know it will change completely: parts of the country will be much drier and increased evaporation will ensure an overall decrease in water availability.* ***This will significantly affect human health, agriculture, other water-intensive economic sectors such as the mining and electricity-generation sectors as well as the environment in general****. Increased occurrence and severity of veld and forest fires; extreme weather events; and floods and droughts will also have significant impacts*" (emphasis added).[148]

126. Alarmingly, and despite the evident intention, and need, to reduce South Africa's dependence on coal for electricity, a significant portion of South Africa's electricity will still be derived from fossil fuels by 2030 – given that the forecasted decline in coal capacity is more than offset by 6 732MW of new coal and 8 100MW of new gas/diesel capacity.[149]

127. The draft IRP 2018 projects that South Africa will have more coal/gas/diesel capacity in 2030 (45 777MW) than in 2018 (42 956MW). This is due largely to the fact that most of the retiring coal capacity is forecasted to be replaced with increased levels of gas/diesel generation rather than clean energy. **In short, when it comes to overall climate progress, the draft IRP 2018 has South Africa moving in the wrong direction through to 2030**.

[145] Section 2(4)(c), NEMA.
[146] Section 2(4)(p), NEMA.
[147] S2, ERA.
[148] P9.
[149] P41, draft IRP 2018.

128. This is not consistent with, nor does it give effect to national policy (the Climate Change Response White Paper for example), which acknowledges the risks for the electricity sector and country as a whole of not taking steps to decarbonise urgently, nor is it aligned with the rights enshrined in the Constitution, particularly section 24, or to our commitments in terms of the Paris Agreement. It is also counter to the global move away from fossil fuels.

129. As stated above, the provision for new coal capacity in the draft IRP 2018 must be abandoned. The decommissioning of existing coal-fired power stations must also be stated more urgently in the IRP. Eskom's current decommissioning schedule in Figure 26 of the draft IRP 2018, is addressed in more detail in the section below, but for purposes of the need for a transition away from fossil fuels, it must be recognised that the closure of Eskom's coal-fired power stations is inevitable and very much at the centre of the transition process. With the closure of coal mines in mind as well, this should be done in a way that facilitates a just energy transition as detailed above. Eskom should actively plan, together with its workers, for a just transition to renewable energy, rather than risk stranding the workforce, along with redundant coal-fired plants.

130. We referred above to the Coal Transitions Report, which warns of the dangers of delaying the coal transition, including the stranding of assets. It makes clear that taking steps now to implement a transition is in fact beneficial for economies and society overall.

131. We note that one of the results of the draft IRP 2018 scenario analyses for the period ending 2030 is that "*[i]mposing carbon budget as a strategy for GHG emission reduction or maintaining the PPD approach used in 2010 will not alter the energy mix by 2030*."[150]

132. It is clear (as we have consistently maintained) that the current peak plateau decline (PPD) trajectory is simply not ambitious enough and cannot be regarded as a "constraint" for the electricity sector. On this basis**, the PPD trajectory and GHG emission reduction ambitions in the IRP must be revised**.

133. We point out that mere alleged compliance with the PPD and consequently South Africa's NDC is not enough to render the IRP in compliance with the Constitution, as far as the reduction of GHG emissions is concerned. Alleged compliance with the NDC does not negate the irreversible and inordinately high GHG emissions and climate impacts of these projects, particularly given that:

    133.1. South Africa's NDC has been criticised as being "highly insufficient" to meet the global target of limiting temperature increase to 2 degrees Celsius above pre-industrial levels;[151] and

    133.2. the Paris Agreement requires party countries' ambitions to become stricter every five years[152] – in other words, even if the projects are within the NDC now, they are unlikely to be in line with South Africa's revised and stricter international commitments in future. South Africa will have to ramp up its commitments and do more to limit its GHGs every five years. For this reason, assuming that compliance with the PPD is sufficient, and locking South Africa into fossil fuel projects with high emissions for many years into the future - and well beyond 2030 - is short-sighted and reckless.

134. Importantly, locking the electricity sector into more unnecessary GHG emissions into the future would require significant costs and effort to reduce emissions in other sectors - such as agriculture and transport, where decarbonisation and the reduction of emissions (unlike the electricity sector) is far more costly and difficult - if South Africa were to meet its NDC commitments and also implement reasonable measures to guard against the impacts of climate change. Effectively, locking South Africa into harmful and expensive fossil fuel infrastructure

[150] P34, draft IRP 2018.
[151] See https://climateactiontracker.org/countries/south-africa/.
[152] Article 4(3), Paris Agreement.

that we do not need is a waste of South Africa's very limited emission space. It also directly contradicts the risk averse and cautious approach required by the NEM Principles.[153]

135. To illustrate, the ERC Coal IPP Report finds that, if South Africa takes its climate change commitments seriously – which we must, given South Africa's particular vulnerability to climate change – it would cost the country R28 billion extra to stay within the low-PPD trajectory if the coal IPPs are built.[154]

136. In relation to the coal IPPs, the ERC Coal IPP Report states:

> *"Meeting the PPD range requires reducing emission in the electricity sector. Meeting low-PPD requires even more rapid decarbonisation of the electricity sector, as well as increased mitigation in other sectors. When the coal IPPs are forced into the electricity build plan, this results in* ***decreased use of existing coal plants*** *(which are also cheaper than the coal IPPs), which puts* ***raises costs overall and puts Eskom at risk****.* ***As more of the emissions 'budget' is used in the electricity sector, this requires either increased mitigation in the power sector through stranding existing coal assets in the later years of the modelling horizon, or increased mitigation in non-electricity sectors (where mitigation is typically costlier than in the power sector)****"* (emphasis added)[155]

137. The Synapse Report states the following:

> "*[t]o meet these global climate change mitigation targets, South Africa will most likely need to achieve total emissions at the low end of its INDC. According to the World Resources Institute, which applauds some aspects of South Africa's INDC, limiting emissions to the low end of the target (roughly 400 million metric tons per year) would account for "a fairer share" of global emissions reductions. Climate Action Tracker, a research project partially funded by the German Ministry for the Environment, Nature Conservation, and Nuclear Safety, considers South Africa's target to be "Highly Insufficient" due to its wide range. However, Climate Action Tracker believes that if South Africa reduces its emissions to the lower end of its target, it will be contributing its fair share toward global carbon reductions. South Africa can take a leading role in responsibly reducing carbon emissions by aiming for the low end of its INDC.* ***To meet a 400 million metric ton emissions target, South Africa will likely need to reduce 2030 emissions from the power sector beyond what is planned in the IRP****. South Africa's current goal is to achieve electric sector emissions of 275 million metric tons per year between 2025 and 2030, which would use up a large portion of the total 400 million metric ton target. For comparison, emissions from electricity generation and heating combined were 295 million metric tons in 2014, while total emissions were 527 million metric tons. Additionally, it is more difficult to reduce emissions from some of the other high-emitting sectors …*
>
> ***It seems unlikely that South Africa can achieve emissions of 400 million metric tons per year while its power sector emits 275 million metric tons per year on its own. The IRP should incorporate a more stringent carbon budget than is included in any of its scenarios. At a minimum, it should include a more aggressive emissions reduction policy as a separately modeled policy scenario***." (emphasis added).[156]

138. Merely alleging compliance with the PPD in the IRP is not enough, nor is it a reasonable, acceptable or holistic approach to the necessary and urgent plan for South Africa as a whole to reduce its GHG emissions.

139. A landmark report released on 8 October 2018 by the Intergovernmental Panel on Climate Change (IPCC) on Global Warming of 1.5 °C ("the IPCC Report"),[157] confirms, *inter alia*, that:

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[153] S2(4)(vii) NEMA.
[154] P34, ERC Coal IPP Report. At https://cer.org.za/wp-content/uploads/2018/05/ERC-Coal-IPP-Study-Report-Finalv2-290518.pdf.
[155] P17, ERC report.
[156] P17, Synapse Report.
[157] http://www.ipcc.ch/report/sr15/.

139.1. human activities have already caused approximately 1.0°C of global warming above pre-industrial levels, resulting in increased natural disasters, droughts, and rising sea levels;

139.2. the risks of allowing temperature increases to reach even 1.5 degrees Celsius are dire (the Paris Agreement currently sets the target at 2 °C);

139.3. limiting global warming to 1.5°C would require "*rapid and far-reaching*" transitions in land, energy, industry, buildings, transport, and cities; and

139.4. global net human-caused emissions of carbon dioxide (CO_2) must fall by about 45 % from 2010 levels by 2030, reaching 'net zero' around 2050.

140. IPCC Report emphasises the following climate change impacts to southern Africa:

> "*At 1.5°C, a robust signal of precipitation reduction is found over the Limpopo basin and smaller areas of the Zambezi basin, in Zambia, as well as in parts of Western Cape, in South Africa, while an increase is projected over central and western South Africa as well as in southern Namibia (Section 3.3.4).*"[158]

141. The IPCC Report also includes Southern Africa as one the "hot spots of change" when comparing a global warming of 1.5°C and 2° C. It states:

> "*The **southern African region is projected to be a climate change hot spot in terms of both hot extremes (Figures 3.5 and 3.6) and drying** (Figure 3.12). Indeed, temperatures have been rising in the subtropical regions of southern Africa at approximately twice the global rate over the last five decades (Engelbrecht et al., 2015). Associated elevated warming of the regional land-based hot extremes has occurred (Section 3.3; Seneviratne et al., 2016). **Increases in the number of hot nights as well as longer and more frequent heat waves are projected even if the global temperature increase is constrained to 1.5°C (high confidence), with further increase at 2°C of global warming and beyond** (high confidence) (Weber et al., 2018) … **Moreover, the region is likely to become generally drier with reduced water availability under low mitigation** (Niang et al., 2014; Engelbrecht et al., 2015; Karl et al., 2015; James et al., 2017), with this particular risk also prominent under 2°C of global warming and even 1.5ºC of warming (Gerten et al., 2013). Risks are significantly reduced, however, under 1.5°C of global warming (Schleussner et al., 2016b). There are consistent and statistically significant projected increases in risks of increased meteorological drought in southern Africa at 2°C vs 1.5°C of warming (medium confidence). Despite the general rainfall reductions projected for southern Africa, daily rainfall intensities are expected to increase over much of the region (medium confidence), and increasingly so with further amounts of global warming. There is medium confidence that livestock in southern Africa will experience increased water stress under both 1.5ºC and 2°C of global warming, with negative economic consequences (e.g., Boone et al., 2017). The region is also projected to experience reduced maize, sorghum and cocoa cropping area suitability as well as yield losses under 1.5°C of warming, with further decreases towards 2°C of warming (World Bank, 2013). **Generally, there is high confidence that vulnerability to decreases in water and food availability is reduced at 1.5°C versus 2°C for southern Africa** (Betts et al., 2018), whilst at 2°C these are expected to be higher (Lehner et al., 2017; Betts et al., 2018; Byers et al., 2018; Rosenzweig et al., 2018) (high confidence)*" (emphasis added).[159]

142. Because the draft IRP 2018 envisions coal still providing 44.6% of installed capacity by 2030, it is **out-of-line with mitigation pathways** to prevent global warming of more than 1.5 °C identified in the IPCC Report, which envisages a 60-80% reduction in the use of coal by 2030 and negligible use of coal by 2050.

[158] IPCC Special Report on "Global Warming of 1.5 °C" at page 3-37
[159] IPCC Special Report on "Global Warming of 1.5 °C" at page 3-145

143. A Dutch appeal court, in the case of the *State of the Netherlands v the Urgenda Foundation,* on 9 October 2018 confirmed[160] that the state was acting unlawfully, and in contravention of the duty of care by failing to pursue a more ambitious GHG emission reduction plan. The court held, *inter alia*, that:

143.1. "*the State has a positive obligation to protect the lives of citizens within its jurisdiction …. This obligation applies to all activities, public and non-public, which could endanger the rights protected …, and certainly in the face of industrial activities which by their very nature are dangerous*";[161]

143.2. "*the Court believes that it is appropriate to speak of a real threat of dangerous climate change, resulting in the serious risk that the current generation of citizens will be confronted with loss of life and/or a disruption of family life. …..[T]he State has a duty to protect against this real threat*";[162] and

143.3. "*up till now the State has done too little to prevent a dangerous climate change and is doing too little to catch up, or at least in the short term (up to end-2020). Targets for 2030 and beyond do not take away from the fact that a dangerous situation is imminent, which requires interventions being taken now. In addition to the risks in that context, the social costs also come into play. The later actions are taken to reduce, the quicker the available carbon budget will diminish, which in turn would require taking considerably more ambitious measures at a later stage…., to eventually achieve the desired level of 95% reduction by 2050*."[163]

144. In line with the above, we confirm that **adopting effective and adequate climate change mitigation measures is in fact a legal – and Constitutional - obligation on the state. Simply adhering to inadequate targets does not, in any way, discharge the state's Constitutional duties to implement proper GHG emission reduction measures.**

The plans for the decommissioning of the existing coal fleet

145. We note that the draft IRP 2018 states, "*[d]ecommissioning of plants is a major consideration in the IRP Update. Eskom coal plants were designed and built for 50-year life, which falls within the 2050 study period of the IRP Update. The full impact of decommissioning the existing Eskom fleet was not studied fully as part of the IRP Update. That included the full costs related to coal and nuclear decommissioning, rehabilitation and waste management. The socio-economic impact of the decommissioning of these plants on the communities who depend on them for economic activity was also not quantified*" and that "*about 12600MW of electricity from coal generation by Eskom will be decommissioned cumulatively by 2030. That will increase to 34400MW by 2050*".[164]

146. We note that the draft IRP 2018 identifies the three key assumptions that have changed since the IRP 2010, to include: electricity demand projections; Eskom's existing plant performance; as well as new technology costs.[165] The accelerated decommissioning of Eskom's older fleet of coal-fired power stations, aside from the associated externalities described above, also carries a strictly financial benefit for Eskom and consumers. The Meridian study, referred to above,[166] finds, *inter alia* that:

146.1. Eskom's inflexible construction programme has now resulted in a significant and growing surplus of expensive generation capacity;

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[160] https://uitspraken.rechtspraak.nl/inziendocument?id=ECLI:NL:GHDHA:2018:2610&showbutton=true&keyword=urgenda.
[161] Para 43.
[162] Para 45.
[163] Para 71.
[164] P27, draft IRP 2018.
[165] P15, draft IRP 2018.
[166] A study by Grové Steyn, Jesse Burton, Marco Steenkamp, 15 November 2017, available at http://meridianeconomics.co.za/wp-content/uploads/2017/11/Eskoms-financial-crisis-and-the-viability-of-coalfired-power-in-SA_ME_20171115.pdf.

146.2. Eskom should accelerate the **decommissioning of three of its older coal-fired power stations** (Hendrina, Grootvlei and Komati) and **curtail the completion of Kusile** units 5 and 6 in order to **save costs**;

146.3. these interventions can be achieved **without affecting security of supply**; and

146.4. these interventions could **save Eskom up to R17 billion**.

147. Indeed, Eskom in its own Integrated Report for 2018 ("the Eskom Integrated Report"),[167] acknowledges that *"[b]ased on the current sales forecast, combined with displacement of capacity from IPPs, EUF [energy utilisation factor] from coal-fired plant is anticipated to reduce to 68% in the next five years. . . ."* meaning *"that we are likely to be left with stranded assets which cannot be optimally utilized"*.[168] Therefore "*a long-term strategy is required to deal with the operating surplus capacity, while minimising the impact on our workforce, suppliers and the community at large*."[169] However, the Eskom Integrated Report then proceeds to confirm that the Corporate Plan "*does not include any specific costs or impacts of the decommissioning of power stations, although it does include cost reductions associated with the extended cold reserve strategy*."[170]

148. The ERC report, "Coal Transitions in South Africa",[171] which forms part of the IDDRI Coal Transitions Report referred to above, contains a useful summary of coal risks for Eskom showing the dates for the end of coal contracts per station in comparison with the stated decommissioning dates as per the draft IRP 2016 (which are the same as those in the draft IRP 2018[172]).[173] Kriel, for example, has its coal contract ending as soon as 2019, with the life-of-mine also being reached in 2019. Yet the stated decommissioning date is ten years later (2029).

149. We are concerned that little to no consideration has been given to the following in planning the decommissioning in the draft IRP 2018:

149.1. What the most economic retirement dates would be, in other words taking plants out of the system as and when they are no longer needed or able to operate efficiently and cost-effectively, rather than simply assuming a full 50 year life-span – for example, given that some stations are not running at all or at full capacity; or

149.2. the fact that Eskom itself appears to have no clear plan for the retirement of its stations, as it has indicated on a number of different occasions that it would be extending the lives of its ageing fleet and then, in contradiction, that it would be closing some of its stations early.

150. Based on the Eskom Integrated Report, Eskom confirms that *"[a]t this stage, we are not intending to renew older stations to extend their useful life. In particular, the older Komati, Hendrina, Grootvlei and Camden Power Stations are not economical to renew and extend beyond their current useful life of 50 years. However, for now they will not be decommissioned, but put into extended cold reserve."*[174] Importantly, the Report also states that "*the possible decommissioning of older stations, will be influenced by DoE's updated Integrated Resource Plan (IRP), once it is published*."[175] It is crucial then that the IRP 2018 imposes a clear decommissioning plan, starting with those stations identified above.

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[167] Available at http://www.eskom.co.za/IR2018/Documents/Eskom2018IntegratedReport.pdf.
[168] P29, Eskom Integrated Report, dated 19 July 2018 available at http://www.eskom.co.za/IR2018/Documents/Eskom2018IntegratedReport.pdf
[169] P29, Eskom Integrated Report 2018.
[170] P62, Eskom Integrated Report 2018. There does appear to be provisioning for 'power station-related environmental restoration – other power plant' of 13 375 million on P105 of the Report, but it is not clear which closure/rehabilitation activities this would cover per station.
[171] Available at https://coaltransitions.files.wordpress.com/2018/09/coaltransitions_finalreport_south-africa_2018.pdf.
[172] Figure 26, draft IRP 2018.
[173] See Table 2,
[174] P87, Eskom Integrated Report 2018.
[175] P92, Eskom Integrated Report 2018.

151. The draft IRP 2018 further states that, "*[t]he decommissioning schedule is linked to Eskom complying with the minimum emission standards in the Air Quality Act No. 39 of 2004 in line with the postponements granted to them by the Department of Environmental Affairs (DEA). A number of Eskom power plants (Majuba, Tutuka, Duvha, Matla, Kriel and Grootvlei) requires (sic) extensive emission abatement retrofits to ensure compliance with the law. Failure to comply is likely to result in these plants becoming unavailable for production, which could lead to the early retirement of some of the units at these plants*."[176]

152. While we certainly support the provision for the shutting down and decommissioning of plants that are unable to comply with legal obligations, we point out that Eskom is currently in the process of seeking numerous subsequent postponements for compliance with the minimum emission standards (MES) under AQA,[177] for multiple stations. If granted, this would mean more time within which Eskom, one the country's largest polluters, would be allowed to continue to cause unacceptable air pollution, with the knowledge of the fatal impacts imposed on surrounding communities.

153. Eskom has already been granted wide-ranging postponements of compliance with the MES.[178] It recently succeeded in two re-applications for postponement of existing plant SO_2 MES for Medupi and Matimba.[179] Its current application is the fourth time Eskom has applied for postponements since 2014, and the second in which it has applied to delay compliance with the 2015 (existing plant) and 2020 (new plant) standards at multiple coal-fired power stations. Eleven of the coal-fired power stations listed in the current MES postponement application are located in the HPA, where – as explained above - communities are suffering devastating health impacts. If Eskom's application is granted, it will allow Eskom to continue causing unacceptable levels of pollution – with no consideration being given to these impacts and costs in the IRP.

154. The Centre for Environmental Rights, along with four other environmental justice organisations, is unwavering in its stance on Eskom's latest unlawful postponement application[180] - the AQA Framework for Air Quality Management ("the Framework"), a revision of which was published today (26 October 2018),[181]clearly provides that postponement applications cannot be granted where there is non-compliance with the NAAQS.[182] All of Eskom's stations are located in air quality priority areas in which there is non-compliance with the NAAQS. On this ground alone, the postponement application should be refused. Furthermore, Eskom's approach to apply for rolling (consecutive) postponements until eventual decommissioning is illegal, as they are equivalent to exemptions (which are not permitted under AQA). Permitting further postponement applications would be in violation of the Constitution, the Framework, and AQA.[183]

155. Further, in relation to the expected and planned retrofits of Eskom stations, as per Figure 26 of the draft IRP 2018 and the observation that "*[f]ailure to comply is likely to result in these plants becoming unavailable for production, which could lead to the early retirement of some of the units at these plants"*, the following should be noted from the Background Information Document (BID)[184] for Eskom's current MES postponement application:

[176] P28, draft IRP 2018.
[177] List of Activities which Result in Atmospheric Emissions ... GN 893, 22 November 2013.
[178] https://cer.org.za/news/joint-media-release-another-five-years-of-toxic-pollution-by-eskom.
[179] See https://cer.org.za/wp-content/uploads/2018/10/Notification-Letter-for-Matimba-and-Medupi-Postponement-Approval.pdf; https://cer.org.za/wp-content/uploads/2018/10/Annexure-A-Matimba-Approval-Letter.pdf; and https://cer.org.za/wp-content/uploads/2018/10/Annexure-B-Medupi-Approval-Letter.pdf.
[180] https://cer.org.za/news/eskoms-latest-bid-to-continue-deadly-pollution-strongly-contested
[181] https://cer.org.za/wp-content/uploads/2018/10/National-Environmental-Managerment-Air-Quality-Act-39-2004-the-2017-National-20181026-GGN-41996-01144.pdf.
[182] P61, the Framework.
[183] The full set of objections are available at https://cer.org.za/wp-content/uploads/2018/09/LAC-MES-Postponement-Submissions-11-September-2018.pdf.
[184] https://cer.org.za/wp-content/uploads/2018/08/English-Background-Information-Document-August-2018.pdf.

155.1. the decommissioning dates in Figure 26 of the draft 2018 IRP and Table 3 in the BID align. However, there are discrepancies in proposed retrofitting of emission reduction technology for Kendal, Matimba, Lethabo and Kriel power stations – for example both Matimba and Kendal have no retrofitting plans indicated in Figure 26, but table 3 of the BID shows that both are planned for further particulate matter (PM) reduction and SO_2 reduction "pilots";[185]

155.2. in its postponement application in 2014 for multiple stations (the majority of which were granted, as indicated above), Eskom communicated an Emission Reduction Plan. It is clear from the updated Emission Reduction Plan in Table 3 in the BID that four stations (Medupi; Majuba; Tutuka; Matla) have unexplained delays in retrofitting the plants; and

155.3. it is clear from a reading of Table 4 in the BID, that even by 2030, thirteen stations will not comply with the **new plant** SO_2 standard, eleven will not comply with the **new plant** NO_x standard and five will not comply with the **new plant** PM standard. Even more alarming is that some plants will still not be compliant with the **existing plant (2015) MES by 2030**. This cannot be accepted. Subject to the necessary retrofitting of emissions-reduction equipment, early retirement for a number of Eskom's existing fleet of coal-fired power stations must be accounted for.

156. We also point out that there are proposed amendments to the MES provisions in the List of Activities – which are already reflected in the amended Framework - which will force all Eskom stations that cannot comply with new plant MES by April 2025 to shut down by 2030, in accordance with a clear decommissioning schedule. In addition, the proposed amendments include that no further postponements of existing plant MES are permissible and only one postponement of new plant MES (and only until April 2025) is permissible.[186] These amendments jeopardise Eskom's current MES postponement application, which are unlawful in any event - as they do not comply with the pre-requisites for seeking postponement - and would require the expedited decommissioning of those coal-fired power stations unable to comply with new plant MES by April 2025. In any event, Eskom cannot be permitted to continue causing unabated pollution – even with postponement of compliance with MES – and for this not to be taken into account in the IRP.

157. It is also disputed whether Eskom is actually currently in compliance with even the relaxed conditions in its various AELs, for various stations. Expert research reveals that non-compliance with these weaker standards in its AELs is widespread. We have brought this to the attention of the Department of Environmental Affairs – calling for enforcement action.[187] An updated expert report on this is being prepared.

158. The revision to the Framework, published today and referred to above, makes clear, in accordance with the above upcoming amendments in the List of Activities, that:

158.1. no further postponements of 2015 MES are permitted;

158.2. only one postponement of 2020 MES, for a maximum of five years is permitted (if all the pre-requisites are met); and

158.3. stations that apply by 31 March 2019 and will be decommissioned by 2030, can be considered for a once-off suspension of compliance (if all the pre-requisites are met).

[185] Table 3, p7, https://cer.org.za/wp-content/uploads/2018/08/English-Background-Information-Document-August-2018.pdf.
[186] https://cer.org.za/news/proposed-new-air-quality-rules-will-force-eskom-to-comply-with-pollution-standards-or-shut-down.
[187] https://cer.org.za/wp-content/uploads/2016/07/CER-letter-to-DEA-re-Eskom-non-compliance_31-May-2017.pdf; and https://cer.org.za/wp-content/uploads/2016/07/AEL-Compliance-Assessment-of-Eskom-CFPSs-final-19-May-2017_final.pdf.

159. The result of this change to the MES postponement provisions (which will be mirrored in amendments to the List of Activities,[188] apparently to be published shortly[189] is that all Eskom's stations that cannot meet new plant MES by April 2025, have to be decommissioned; unless they apply by 31 March 2019 and are granted a once-off suspension of compliance; in which event, they have to be decommissioned by 2030 (and are permitted to comply with 2015 MES until then).

160. However, the draft IRP fails to model this likely expedited decommissioning schedule; and instead retains Eskom stations for 50–year lives. This inaccurate reflection must be remedied. The ERC is currently finalising an alternative analysis and assessment of electricity pathways, which does include this legislative change, and takes Eskom stations out of the system when they are no longer economic. **We reserve the right to supplement our submissions to include the ERC's alternative assessment, we and call upon the DoE to amend the IRP to include these important considerations**.

161. **We therefore submit that the decommissioning of Eskom plants must be linked not only to non-compliance with MES and weaker emission standards in its AELs, but also non-compliance with, and provisions of, other legal obligations and requirements in AQA, NEMA, and the Constitution; considerations of harmful and unconstitutional pollution being caused and the external costs of this, as well as economic factors** as stated above. **We recommend that the IRP expressly state that the decommissioning schedule should also be linked to compliance with AEL conditions and NAAQS in the area where the power stations are located**.

162. The draft IRP 2018 itself acknowledges that the full impacts of decommissioning have not been fully studied, and there appears to be no evaluation of what the most economic or beneficial retirement years would be for any of the existing coal units. **The blind assumption that all plants would simply operate for a 50 year lifespan without a full decommissioning assessment or consideration of the legal requirements or factors on the ground, is arbitrary, and must be rectified in the final IRP**. Unreasonably retaining this high level assumption – particularly given the situations of excess capacity and the harmful pollution from Eskom - would, we contend, contradict the overarching aim of the IRP update process which aims to balance a number of objectives, namely to ensure security of supply, to minimise cost of electricity, to minimise negative environmental impact (emissions) and to minimise water usage.

The extensive provision for new gas capacity and the lack of any clarity on, *inter alia*, the source of gas

163. The draft IRP 2018 proposes an addition of 8 100MW of new gas supply, to be developed in 2026 (2 250MW); 2027 (1 200MW); 2028 (1 800MW); and 2029 (2 850MW), resulting in a total installed gas/diesel capacity (including existing 3 830MW of open cycle gas turbines (OCGT) that currently operate on diesel) of 11 930MW. This makes up 16% of the total installed capacity mix by 2030.

164. A major concern related to the extensive proposed increase in gas installed capacity in the draft IRP 2018, is the proposed source of the gas – as this is not specified in the draft IRP 2018 - and the associated impacts of the intended additional gas capacity.

165. The supply of natural gas can either be provided from increasing imports, presumably from Mozambique, or from developing local reserves. In the case of the latter, it is evident that the Department of Mineral Resources (DMR) and the Petroleum Agency of South Africa have prioritised offshore gas exploration and production and hydraulic fracturing of shale gas in the Central Karoo and KwaZulu-Natal (KZN). We have significant concerns with this and with the draft IRP 2018 if the intention is to develop local gas reserves and lock South Africa into unnecessary gas infrastructure.

[188] List of Activities which Result in Atmospheric Emissions ... GN 893, 22 November 2013.

[189] The MES List of Activities together with the Framework set out the process for applying for and obtaining a postponement for compliance with the MES under AQA.

166. Currently, more than 90% of South Africa's exclusive economic zone is subject to a right or lease for offshore oil and gas exploration or production.[190] Operation Phakisa outlines ambitions to produce 370 000 barrels of oil and gas per day; and to exploit resources that could amount to 60 trillion cubic feet (Tcf) of gas from our marine environment.[191] The extent of planned offshore gas activities would result in considerable negative environmental impacts for South Africa's coasts and the ocean. These impacts include climate change impacts associated with opening up new hydrocarbon reserves, direct impacts of drilling activities, and risks associated with potential CH_4 leaks.[192] Notably, there is considerable concern related to impacts of seismic surveys that are being conducted across South Africa's coastline, but particularly concentrated off the coast of Kwa-Zulu Natal. The negative impacts of seismic surveys on marine life, including marine mammals and fish, have been well studied.[193] Notably, these impacts have considerable knock-on effects on subsistence fisher-folk and their livelihoods. Such seismic testing is done in terms of a reconnaissance permit[194] which, currently, does not require environmental authorisation. In other words, these impacts are not assessed under NEMA.

167. There have been an increasing number of applications for unconventional offshore gas activities. PetroSA, for instance, has recently applied for environmental authorisation to undertake hydraulic fracturing in the F-O Gas Field off Mossel Bay.

168. The most recent iteration of the Petroleum Exploration and Production Regulations (technical regulations for fracking) exclude offshore exploration and production from their scope. Accordingly, marine fracking is currently unregulated - an untenable situation, aggravated by little available knowledge of potential impacts on marine ecosystems and industries, including fishing.

169. Based on recent announcements that DoE and DMR are "*working on legislation that will pave the way for fracking*",[195] it is assumed that a large component of envisaged gas capacity will be supplied by hydraulic fracturing of shale in the Central Karoo, or elsewhere in South Africa. This is despite the considerable potential negative impacts this would have, outlined in a comprehensive Strategic Environmental Assessment,[196] on groundwater, groundwater-reliant ecosystems, and livestock and agriculture, as well as the likely occurrence of gas leaks at well-heads.[197]

170. The above-mentioned impacts of fracking and offshore gas production are likewise externalities that have not been considered at all in the costing of gas and for cost comparisons in the draft IRP 2018. Further, it is uncertain whether the full life-cycle of gas has been considered in relation to the emission reduction trajectory and CO_2 constraint in the draft IRP 2018 modelling. Whereas burning natural gas (CH_4) is roughly half as carbon-intensive as coal-fired power generation, **CH_4 leakage from extraction, transport, and storage of natural gas (particularly from pipelines and well heads) is often considerable, thus hindering any advantage in terms of GHG emission reductions, when gas is properly compared to other electricity sources, including coal**.

171. The draft IRP 2018 does not specify whether OCGT or combined cycle gas turbines (CCGT) will be utilised for the 8 100MW of additional intended gas installed capacity – this will have associated implications related to costs and dealing with peak demand. In essence, it is uncertain whether the draft IRP 2018 intends to build more gas peaking plants or whether CCGT will be used. **This must be clarified, and the impacts and costs of all options fully assessed**.

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[190] www.petroleumagencysa.com.

[191] Republic of South Africa (RSA). (2014). Operation Phakisa: Offshore Oil and Gas Final Lab Report.

[192] Atkinson, L. and Sink, K. (2008). 2008. User profiles for the South African offshore environment. SANBI Biodiversity Series 10. South African National Biodiversity Institute, Pretoria.

[193] Carroll, A.G., Przeslawski, R., Duncan, A., Gunning, M. and Bruce, B. 2017. A critical review of the potential impacts of marine seismic surveys on fish & invertebrates. Marine Pollution Bulletin, 114: 9-24.

[194] In terms of s.74(4) of the Mineral and Petroleum Resources Development Act, 2002 (MPRDA.

[195] https://ewn.co.za/2018/08/27/govt-to-focus-on-gas-as-part-of-power-mix

[196] http://seasgd.csir.co.za/wp-content/uploads/2015/11/Shale-Gas-SEA-Process-Document_V3_30-Nov-2015.pdf.

[197] Scholes, R., Lochner, P., Schreiner, G., Snyman-Van der Walt, L. and de Jager, M. (eds.). 2016. *Shale Gas Development in the Central Karoo: A Scientific Assessment of the Opportunities and Risks.* CSIR.

172. Related to the aforementioned, the draft IRP 2018 must consider the need for a fleet of additional gas peaking plants alongside considerations of battery and storage options (where prices continue to decline), demand responses to flatten peaks and energy efficiency alternatives. Notably, there are increasing examples of battery storage (alongside renewable supply) competing successfully (in terms of cost, flexibility, grid stability, and meeting peak demand) against new gas peaking plants.

173. Further, Concentrated Solar Power (CSP) is an important renewable technology that is dispatchable. CSP has a long economic life and as a result of South Africa's solar resources, is highly competitive. Despite these advantages, the draft 2018 IRP proposes only 600MW of CSP by 2030. Importantly, due to its storage and dispatachable nature, increased deployment of CSP would mitigate the need for more gas peaking plants.

174. The draft IRP 2018 acknowledges that increased reliance on natural gas will expose the system to price fluctuations, among other risks.[198] Natural gas is a global commodity, and hence natural gas prices will largely be set by global markets, which can be volatile and subject to currency fluctuations. As highlighted by the Synapse report, "*[m]ost of the IRP scenarios assume that gas prices stay flat in real terms, without providing any support for that assumption. Instead, the IRP should include base fuel price forecasts that are grounded in an independent market analysis and should explore the impacts of fuel price sensitivities that are also tied to potential future market scenarios*."[199] It is evident that system costs are very sensitive to fuel cost assumptions. Therefore, the draft IRP 2018 should have evaluated additional gas price sensitivities to understand the full risks associated with fuel cost volatility.

175. In general, arguments on the benefits of gas; including: emission reductions in comparison to coal; complementarity with renewable energy and associated intermittency; flexibility and dispatchability; and its potential as a bridging fuel, are rapidly becoming less persuasive. **There are major risks, as well as potential significant impacts and externalities attached to the proposed gas build-out envisaged by the draft IRP 2018. The draft IRP 2018 must – in order to avoid legal conflicts – refrain from locking South Africa into further harmful fossil fuel infrastructure, including from gas – particularly if it is intended to be exploited offshore or through fracking - with irreversible impacts**. It is not reasonable to plan any new gas peaking plant capacity, particularly not without considering battery, demand response, or energy efficiency alternatives.

The lack of adequate and accurate consideration of aspects which significantly affect assumptions around South Africa's electricity needs and planning

<u>Demand forecasts</u>

176. The energy demand forecast in the draft IRP 2018 appears to be highly inflated.

177. The draft IRP 2018 acknowledges that, while the IRP 2010 forecasted 3 % annual growth in energy demand, demand actually shrunk by an average of 0.6% per year from 2010 through to 2016, leading to the actual demand in 2016 being 18% lower than forecasted.[200] According to the Synapse report, "*this meant that electricity generation in South Africa in 2016 was more than 50 terawatt-hours (TWh) lower than forecasted. If its load forecast led South Africa to invest in new power plants to provide such a large amount of unneeded generation, it likely wasted tens of billions of dollars in capital costs*".[201]

178. The underlying causes of lower-than-expected electricity demand between 2010 to 2016, outlined in the draft IRP 2018, include: lower-than-anticipated economic growth; lower productivity levels of large electricity users; improved energy efficiency; supply constraints; installation of embedded generation; grid defections; customers

[198] P68, draft IRP 2018.
[199] P22, Synapse report.
[200] P18, draft IRP 2018.
[201] P5, Synapse report.

responding to tariff increases (price elasticity of demand); fuel switching (mainly to liquefied petroleum gas (LPG) for cooking and heating and solar water heating); and relocation or closing down of energy-intensive smelters.[202]

179. Despite the demand forecast of the IRP 2010 being so inaccurate, the draft IRP 2018 again ambitiously (and, we submit, inaccurately) forecasts that energy demand growth will return, with the upper, median, and low forecasts all showing increasing demand in every year from 2016 through to 2050. Whilst the draft IRP 2018 acknowledges factors that have led to a declining load, it fails to adequately account for these factors in the updated demand forecast. Instead, the draft IRP 2018 irrationally forecasts that sales will immediately start increasing steadily, without providing reasoned justifications for this expected departure from recent trends, and despite the evident need for a cautious and risk-averse approach (as required by section 2 of NEMA[203]) and saving of costs. At a minimum, there should have been at least one scenario tested in which energy demand remains flat.

180. The above is particularly true in light of the fact that many of the factors and conditions that resulted in repressed electricity demand between 2010 and 2016 not only remain, but will intensify to 2030. In particular:

    180.1. energy efficiency will continue to improve and energy intensity of large electricity users will decline. The draft Post-2015 National Energy Efficiency Strategy[204] highlights that the weighted mean of individual sector-level efficiency impacts, based on a decomposition analysis, will result in an economy-wide reduction in energy consumption of 29%, attributable to efficiency improvements;

    180.2. there is a global trend, also evident in South Africa's electricity demand trends, of decoupling of economic growth from electricity consumption;

    180.3. reduced electricity consumption is further inevitable as a result of tariff increases, and associated price elasticity of demand (demand fluctuations related to price fluctuations – mainly increases), along with rapidly-declining costs of energy efficiency and embedded generation technologies. This suppressed demand will be enhanced due to opting for a policy-adjusted scenario as outlined in the draft IRP 2018, which "*will result in about 5% higher tariff by year 2030 compared to the least cost scenario*";[205] and

    180.4. the draft IRP 2018 highlights that "*there is evidence of growing rooftop Photo-voltaic (PV) installations. Current installed capacity is still very small. However, this is likely to increase in the medium to long term*".[206] The annual allocation of 200MW for generation-for-own-use between 1MW to 10MW outlined in the draft IRP 2018 recommended plan is low. This assumes an unrealistically-low uptake of small-scale embedded generation capacity. This is particularly unrealistic in light of the rising uptake of distributed generation in South Africa, along with the gradual introduction of feed-in tariffs and installation standards being adopted by municipalities. It is anticipated that even a small incentive, through largely revenue neutral two-way tariffs for example, adopted by municipalities, will have large impacts on distributed PV uptake.

181. The Synapse Report confirms that "*[t]he IRP relies on an inappropriate load forecasting methodology that does not consider important recent trends in electricity demand. This means that the IRP could lead to the procurement of unnecessary generating capacity that will be paid for by electricity consumers*."[207] The Report highlights further that:

> *"the IRP's load forecast is rooted in sector-specific regression models based on historical data. While this methodology has been adjusted to some degree to account for changes in the electricity intensity of the*

[202] P18, draft IRP 2018.
[203] S2(4)(vii), NEMA.
[204] https://cer.org.za/wp-content/uploads/2017/01/National-Energy-Efficiency-Strategy.pdf.
[205] P53, draft IRP 2018.
[206] P18, draft IRP 2018.
[207] P1, Synapse Report.

South African economy, it remains essentially grounded in past economic relationships. For example, domestic electricity use is forecasted solely based on its historical relationship to final consumption expenditures by households. This presumes that the relationship between household expenditures and electricity use remains essentially unchanged, but this is not the case. Instead, the IRP makes clear that energy efficiency, fuel switching, and other factors have reduced the extent to which increased economic activity leads to increased electricity demand".[208]

182. In light of the above, we submit that a sound load forecast should ideally incorporate a bottom-up approach based on recent trends in electricity consumption, rather than relying solely on a top-down regression model. This should directly "*forecast the number of future electricity customers, the types of electricity use associated with each customer type, and the quantity of consumption associated with each use. This approach to forecasting has become more common and more important as historical relationships between electricity demand and such traditional explanatory factors as economic growth have changed*".[209] At a minimum, any load forecast should explicitly capture recent trends in electricity demand rather than relying on historical relationships that may no longer apply.

183. The draft IRP 2018 tries to justify the load forecast's limited treatment of distributed generation, energy efficiency, and fuel-switching by stating that these factors were "*considered to be covered in the low-demand scenario."* This explanation is plainly inadequate. Such important and clear trends should be accounted for in a base scenario, rather than being limited to a "low-demand" sensitivity.

184. Notably, the draft IRP 2018 identifies a need for 39 730MW of new generation capacity, but provides no data about peak load or planning reserves to support this conclusion. It forecasts peak demand of 40 gigawatts (GW) in 2020, 48GW in 2030, 54GW in 2040, and 61GW in 2050;[210] yet it presents no explanation or information as to how these peak demand figures were arrived at or what assumptions were used in such forecasting. Neither the draft IRP 2018 nor the supporting document "Forecasts for Electricity Demand in South Africa (2017 – 2050) using the CSIR Sectoral Regression Model for the Integrated Resource Plan of South Africa", provide the methodology used to develop the peak load values found in the draft IRP 2018. Further, no information is given regarding South Africa's reserve margins, which should be applied to the peak load forecast in order to determine the necessary planning reserve. The DoE also fails to provide a capacity balance indicating the total quantity of new resources needed to maintain system reliability. Without an accurate peak demand forecast, the *"draft 2018 IRP lacks a sound basis for determining the magnitude of capacity additions over the analysis period",*[211] according to the Synapse report. This has further relevance to the questionable and disputed need for, and desirability of, any further gas/diesel peaking plants.

185. **Thus, in the context of declining electricity demand, trends of lower-than-anticipated GDP growth, increased energy efficiency, and grid defections, we submit that additional generation capacity (39 730MW determined by the Minister of Energy and 18 000MW committed) in the draft IRP 2018, is not reasonable and cannot be justified**.

186. Related to the above, the draft IRP 2018 pays very little attention to demand-side management and energy efficiency and alignment, despite the fact that energy efficiency and demand-side management are efficient, cost-effective, and feasible means to ensure rapid and significant emission reductions, electricity supply and access and, at the same time, promote labour-intensive and localised opportunities to ensure a just transition to sustainable energy systems for the people.

187. Prioritising energy efficiency and demand-side management would have additional co-benefits of alleviating energy poverty, reducing GHG emissions, reducing air and water pollution, job creation, and stimulating a small

[208] P7, Synapse Report.
[209] P9, Synapse Report
[210] P35-36, Figures 11 and 12, draft IRP 2018.
[211] P13 Synapse Report

business sector. The current programme to roll-out domestic solar water heaters (SWH) would serve as a good example of such an opportunity. The replacement of conventional geysers with SWHs is usually the single most cost-effective and significant intervention to reduce household energy demand and shift load away from peak demand. As outlined in the draft IEP 2016 'Cleaner Pastures' scenario', the installation of 5 million SWHs, targeting 30% of South African households, would reduce annual demand by about 6 TWh or 3% of total demand. A longer term SWH roll-out programme, to all 16 million South African households, would have a considerable impact on total demand for the country, and therefore substantial benefits for electricity planning.

Technology costs

188. It appears that the underlying baseline cost estimates in the draft IRP 2018[212] are based on figures from the supporting document "Power Generation For Integrated Resource Plan of SA" prepared by the Electric Power Research Institute (EPRI) ("the EPRI Report")[213] that have been adjusted to reflect 2017 figures by adding a 2.5% escalation rate. This is not a sufficient approach to providing the most recent cost estimates of different power technologies, especially in view of the dramatic price decline of renewable energy technologies.

189. Notably, the draft IRP 2018's assumed current costs for solar and wind projects are high. The cost estimates for solar PV and wind used in the draft IRP 2018[214] are based on average actual costs achieved by the South African Renewable IPP Programme, as opposed to the figures in the EPRI Report or a more market-aligned figure. Notably, the modelled costs are 15 % higher for solar and 19 % higher for wind than 2017 actual costs published by industry expert Lazard.[215]

190. More importantly, the draft IRP 2018's assumptions regarding the future costs of renewables are unjustifiably high and inaccurate. The draft IRP 2018 assumes that solar and wind costs decline by only 20% between 2015 and 2050. Outside experts expect much more rapid declines. Bloomberg New Energy Finance projects that global solar costs will drop by 71% between 2018 and 2050, and that wind costs will drop by 58% over the same period.[216]

191. The IRP also relies on unreasonably high and out-of-date cost assumptions for battery storage. Notably, it appears, that the draft IRP 2018's battery storage cost assumptions use 2015 figures that were then escalated by 2.5% per year to arrive at an "updated" 2017 cost. As highlighted in the Synapse Report, "*batteries can serve as an important part of future resource portfolios, as evidenced by global trends showing an uptake in battery storage deployment*".[217]

    191.1. The International Renewable Energy Association (IRENA) projects that electricity storage capacity will triple in energy terms by 2030 in order to accommodate increased global renewable deployment.[218] In 2017, the United Kingdom installed 140MW of battery storage capacity and Germany installed 75 MW. Across Europe, more than 1.1GW of new battery storage resources are in the pipeline for 2018.[219]

    191.2. There have been rapid changes in battery technology and costs in the past three years. In fact, battery costs have decreased substantially since 2015, and are expected to continue to decline. IRENA finds that lithium ion battery storage costs fell by as much as 73% between 2010 and 2016 and projects that they will decline by another 60% between 2016 and 2030.[220]The battery storage cost assumptions used in the

[212] P22, draft IRP 2018.
[213] http://www.energy.gov.za/IRP/irp-update-draft-report2018/EPRI-Report-2017.pdf.
[214] P23, draft IRP 2018.
[215] Lazard's Levelized Cost of Energy Analysis – Version 11.0.
[216] BNEF, New Energy Outlook 2018. https://about.bnef.com/new-energy-outlook/.
[217] P12, Synapse Report.
[218] International Renewable Energy Agency. Electricity Storage and Renewables: Costs and Markets to 2030. October 2017, p. 8.
[219] Buchsbaum, L. 2018. "Renewable Energy Storage Takes Off in Europe." May 1, 2018. https://www.powermag.com/renewable-energy-storage-takes-off-in-europe/?pagenum=2.
[220] International Renewable Energy Agency. 2017. Electricity Storage and Renewables: Costs and Markets to 2030, p. 12.

draft IRP 2018 are nearly double the level indicated by Lazard's latest industry-standard Levelized Cost of Storage Report.[221]

191.3. Whilst the EPRI Report does in fact highlight that battery costs are expected to decline by 30% or more over the next five years, the draft IRP 2018 does not appear to incorporate any realistic cost decline assumptions for battery storage in the modelling.

191.4. Further, the EPRI Report describes lithium ion as being at the "pilot" stage and estimates the cost of a 3MW battery. In terms of size, this is far smaller than the utility-scale batteries that have been deployed worldwide recently, indicating, again, the fact that assumptions around storage capacity and costs are woefully outdated.

192. In light of the above, the draft IRP 2018 should not rely on 2015 data, particularly if this informs decisions to develop gas peaking plants, rather than focus on storage. Rather, the Synapse report submits that "*given the lack of available regionally specific data on battery storage installation costs, the Department should have solicited quotes from battery storage project developers as part of the REIPPP or during the IRP process and should have modeled a variety of battery storage cost sensitivities to understand the value that battery storage can offer to the South Africa electric system".*[222]

193. Further, the draft IRP 2018 provides for different, additional transmission-related costs for wind and solar PV, which have not been applied to coal and gas power generation. It states that "*For [renewable energy] technologies (wind and solar PV), the transmission infrastructure costs entailed collector stations and the associated lines connecting to the main transmission station, as well as the transmission substation costs. For conventional technologies, the costs entailed only the main transmission substation costs"*.[223] Whilst we acknowledge that it is reasonable to assign transmission costs to new generation in instances where they require specific system investments or upgrades, we submit – and the Synapse Report confirms - that "*this principle should be applied evenly to all resources based on the individual project's impact on the grid*".[224] Notably, accurate costing of transmission-related costs should be site-dependent. This principle is outlined in the Synapse Report, which submits that *"average incremental transmission costs should be incorporated into the model based on the most representative new renewable connection sites, not simply based on average connection costs across the entire system. This requires identifying where solar and wind resources are most likely to be installed (based on resource potential, among other factors) and evaluating the costs to connect to the system only at those likely connection points".*[225]

Grid stability risks

194. The draft IRP 2018 overestimates risks to grid stability from increased renewable energy penetration. As highlighted by the Synapse Report,[226] various countries have reliably integrated renewable generation into the grid, including the following as examples:

194.1. Denmark generated 46 of the electricity it consumed from wind and solar in 2017, with wind and solar accounting for more than 49 % of installed capacity;

194.2. Ireland generated 26% of its electricity from wind power alone in 2017, according to the Irish Wind Energy Association; and

[221] https://www.lazard.com/media/450338/lazard-levelized-cost-of-storage-version-30.pdf.
[222] P15, Synapse Report.
[223] P30, draft IRP 2018.
[224] P13, draft IRP 2018.
[225] P15, Synapse Report.
[226] P21, Synapse Report

194.3. Hawaii generated 16.7% of its electricity from solar and wind, which accounted for 26.7 % of installed capacity by December. The state has set a target of 100% renewable energy for 2045.

195. The above renewable energy penetration levels have not impacted on the stability of the grid in the respective jurisdictions. There is no reason that this should be a concern in South Africa.

196. In light of the above, the Synapse report highlights that "*[a] risk assessment should be quantitatively grounded to the extent possible and otherwise should be rooted in thorough qualitative analysis.* ***The 2018 IRP's discussion of grid stability risks posed by renewables does not meet these standards***" (emphasis added).[227]

Rapidly changing energy landscapes

197. Notably, the draft IRP 2018 does not properly engage with or address the rapidly-changing energy landscape that is occurring in diverse contexts, on a global scale. These changes, labelled 'the renewable energy revolution'[228] are occurring at a rate exceeding predictions.[229]

198. Notably, the largest change in electricity regimes is coming from distributed energy. Models predict that, by 2040, distributed solar will be cheaper than grid electricity in every major economy.[230] This lays the foundation for an entirely different electricity system based on distributed supply.[231] Conversely, this is placing a convergence of disruptive challenges on traditional electricity utility models, resulting in reduced electricity sales and revenue and eventually utility death spirals.[232] These dynamics are well underway in South Africa. Thus, at the very least, the draft IRP 2018 should engage more thoroughly with dynamics related to battery/storage technologies, electric vehicles, smart grid technologies and distributed energy, as well as exploring and experimenting with diverse revenue, business and institutional models.

199. In South Africa's context, with the above dynamics in mind, and the submissions in relation to the coal transition above, there is considerable potential for a just energy transition that is based on, *inter-alia*:

199.1. a mix of socially-owned, distributed renewable energy generation, operating on different scales - including household, community, municipal and utility scales - linked to a national grid that continues to facilitate and increase cross-subsidies between users;

199.2. Eskom becoming the owner of significant renewable energy assets in the interest of all South Africans, including support for local and community ownership of renewable energy facilities;

199.3. integrated energy planning and implementation of existing energy policies that promote energy efficiency, demand-side management, and behaviour change, and support local manufacture and installation of energy efficiency technologies and corresponding local job opportunities, ownership and skills development in the energy services sector; and

199.4. the urgent provision of energy services to low-income households and informal settlements.

Public participation and access to modelling data

200. We note with concern that there have been **no public consultation meetings hosted by DoE in relation to the draft IRP 2018**. This is highly problematic for the rights to a fair process and of access to information, particularly

[227] P19, Synapse Report.
[228] REN21, 2014.
[229] International Energy Agency, 2014.
[230] Worldwatch Institute, 2014.
[231] UNEP, 2012.
[232] World Bank, 2015.

as: many South Africans do not have access to the resources and expertise required to access, consider and comment on the content and implications of the draft IRP 2018; despite this being a crucial planning document, with significant implications for all South Africans, particularly communities living in the areas where South Africa's electricity is generated and the resources for that electricity (such as coal) mined and obtained.

201. In relation to the draft IRP 2016 – where public consultations were, at least, held - we noted our concern (in the draft IRP 2016 comments) with the fact that public consultation meetings were only held in major cities[233] within South Africa, but not in the towns where communities most impacted by the energy decisions made in terms of the IRP Update and IEP (and where the majority of South Africa's energy-generation activities) are based – these being the towns within the Highveld; Vaal Triangle; South Durban basin; and Waterberg, where the refineries and coal-fired power stations are located and where additional polluting industries are planned to be located. People in these areas are continuously being negatively impacted by and suffering violations of their constitutional environmental rights as a result of these polluting industries. We submitted – and continue now to submit - that it was a fatal flaw to fail to hold consultation meetings in towns and areas such as: Middelburg; Witbank; Delmas; Sasolburg; Vereeniging; Secunda; Wentworth and Austerville (South Durban); Lephalale; and Steenbokpan.

202. Regulation 4 of the New Generation Regulations states that "*the integrated resource plan shall- (a) be developed by the Minister after consultation with the Regulator (NERSA) …".* The Western Cape High Court – in the case of *Earthlife Africa Johannesburg and Another v Minister of Energy and Others*[234] - confirmed that all NERSA decisions are administrative action and subject to public participation. At the very least, insofar as NERSA's consultation and decision-making in respect of the IRP are required, adequate and full public participation in relation to the IRP must be conducted.

203. A further concern is the DoE's failure to make crucial modelling data relevant to the IRP available to stakeholders.

204. On 26 September 2018, we wrote to the DoE to request the Plexos modelling input and output data used for the draft IRP 2018, pointing out that:

    204.1. the IRP is a crucial planning document, the outcomes of which have significant and far-reaching implications for all South Africans, particularly in terms of electricity costs, economic implications and impacts for our health, water and climate; and

    204.2. in order to properly consider and assess the conclusions of the draft IRP 2018, it is essential that the modelling data relied upon by the DoE in formulating the draft IRP 2018, be made available to stakeholders for consideration.

205. We asked that the information be made available by no later than 3 October 2018. On 15 October 2018 we submitted a formal, urgent request in terms of the Promotion of Access to Information Act, 2000 (PAIA) for this information, requesting that the information – in light of the urgency and our previous written request to DoE of September 2018 - be made available by 19 October 2018. The official deadline for the PAIA request, however, is 14 November 2018.

206. On 25 October 2018, one day before the deadline for these comments, we received a response from the DoE, which stated that "*[t]he assumptions for the input data are detailed in the draft IRP 2018 report published together with the supporting detailed reports. All these can be accessed on the Department website … We have also attached to this letter output tables with results for various scenarios reported on in the draft IRP 2018report as requested*."

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[233] Consultation meetings were, according to the DIE website, held in: Bloemfontein; Mmabatho; Durban; Port Elizabeth; Cape Town; Nelspruit; Polokwane; Kimberley; Cape Town; and Gauteng.

[234] *Earthlife Africa Johannesburg and Another v Minister of Energy and Others* (19529/2015) [2017] ZAWCHC 50; [2017] 3 All SA 187 (WCC); 2017 (5) SA 227 (WCC) (26 April 2017) available at http://www.saflii.org/za/cases/ZAWCHC/2017/50.html.

207. This, however, is not the information that we have requested. We requested, and require, access to the Plexos modelling input and output data, in an excel spreadsheet (or other user-friendly) format, in order to interrogate the modelling behind the draft IRP 2018.

208. We reserve our rights to supplement these comments once the requested modelling data has been received and considered.

209. Related to the lack of modelling data, the draft 2018 IRP documentation, in general, is limited. According to the Synapse Report, under most jurisdictions that undergo IRP processes, stakeholders have access to a broad array of information relevant to the IRP. This information typically includes several types of data and analyses (that were not provided along with the draft IRP 2018), such as: load and resource balances; peak load forecasts; and other modelling inputs and outputs. Several jurisdictions within the US additionally ensure access to all IRP work-papers and modelling files, and provide the public with the opportunity to obtain additional information through a formal process. The broader provision of IRP materials improves transparency and enables more productive stakeholder engagement with the IRP process.[235]

Conclusion

210. We urge the DoE to fully consider our submissions above, and to ensure that the IRP is appropriately amended in line with these submissions. We call for a reasonable, rational and lawful least-cost IRP that is in the public interest, and has been subject to proper consultation, particularly with affected communities and with full access to relevant input data, to be promulgated without delay.

211. We emphasise that a draft IRP that makes provision for new, unnecessary, and harmful coal capacity, at a time when South Africa needs to be urgently transitioning away from coal, is not a reasonable measure and would be in conflict with the Constitution.

Yours faithfully
CENTRE FOR ENVIRONMENTAL RIGHTS

per:

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[235] P21, Synapse Report.