

Environmental constraints: CO₂ and water

Dave Collins
5th October 2018



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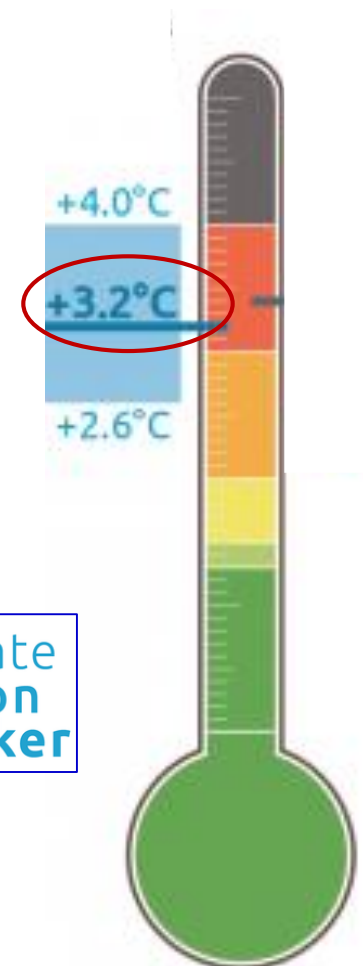
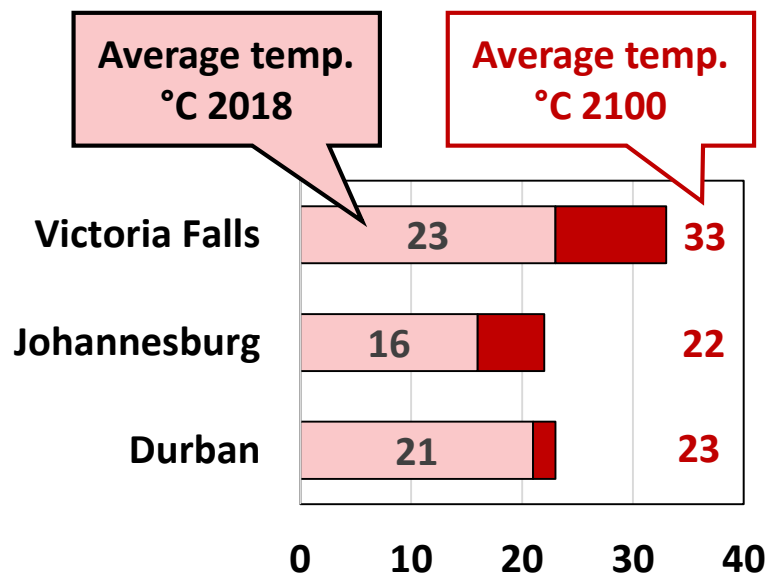
1. Climate change is happening
2. The world is acting to reduce GHG emissions
3. South Africa has a GHG emissions problem
4. South Africa's GHG emissions reduction pledge is inadequate, and ...
5. Decarbonisation of electricity as per IRP 2018 is part of the solution
6. Water requirements of the IRP
7. Impact of future carbon pricing

1. Climate change is happening

The world is warming naturally, and anthropogenic GHG emissions (mostly CO₂) are making it worse.

The current global average projection for 2100 is a 3.2°C rise over pre-industrial temperatures.

The interior of Southern Africa will be double that, with some parts 3x.



2. The world is acting to reduce GHG emissions

Need 2°C maximum by 2100 – embedded in the Paris Agreement.

Since the US withdrawal from the Paris Agreement, representatives of more than 130 million Americans (40% of total) and \$6.2 trillion of the U.S. economy (33% of GDP) have signed the ***We Are Still In*** declaration.

Its signatories “demonstrate America’s enduring commitment to delivering on the promise of the Paris Agreement and America’s contribution to it.”

In any event, the laws of physics and climate change will ultimately trump the intentions of the current US administration.

Awareness is increasing.



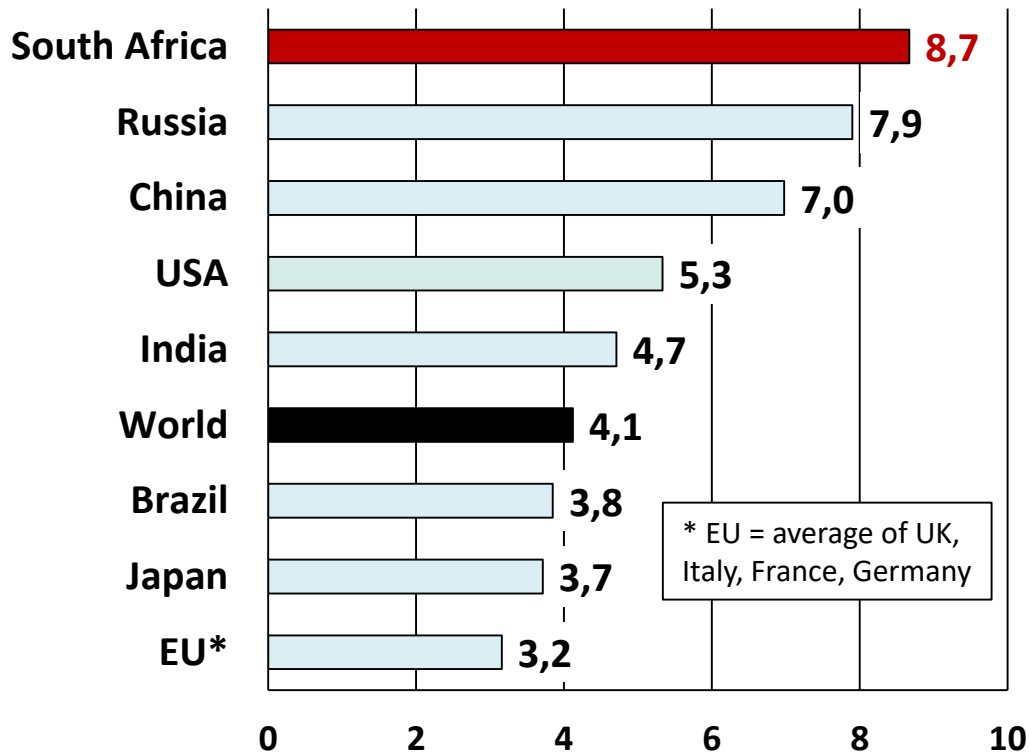
<https://www.wearestillin.com/>

3. South Africa has a GHG emissions problem

SA has an energy-intensive economy

SA uses more than twice the world average energy per unit of GDP

MJ energy per \$ GDP



* EU = average of UK, Italy, France, Germany

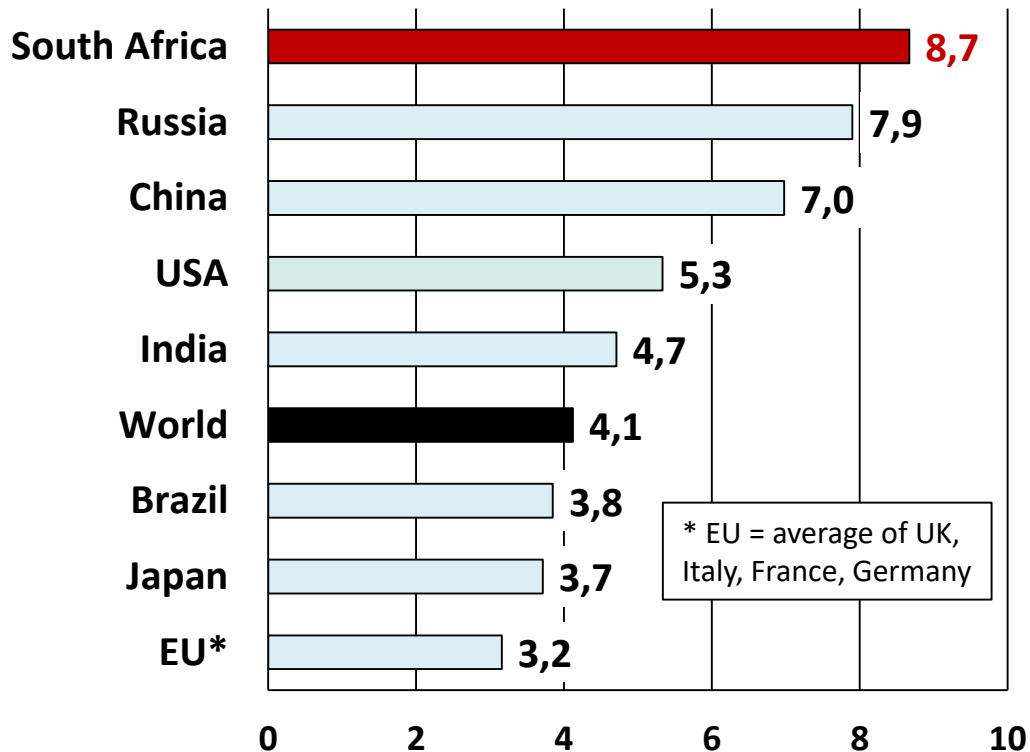
World Bank, 2014 data

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SA uses more than twice the world average energy per unit of GDP

MJ energy per \$ GDP



There is a very high proportion from fossil fuels - particularly coal (70%).

Coal-fired electricity generation results in 45% of SA's GHG emissions, so tackling electricity emissions is part of the solution

World Bank, 2014 data

4. South Africa's GHG emissions reduction pledge is inadequate

SA's emissions reduction ambition is embedded in its Paris Agreement commitment (NDC): this falls short of what is required to avoid a global 2°C rise.

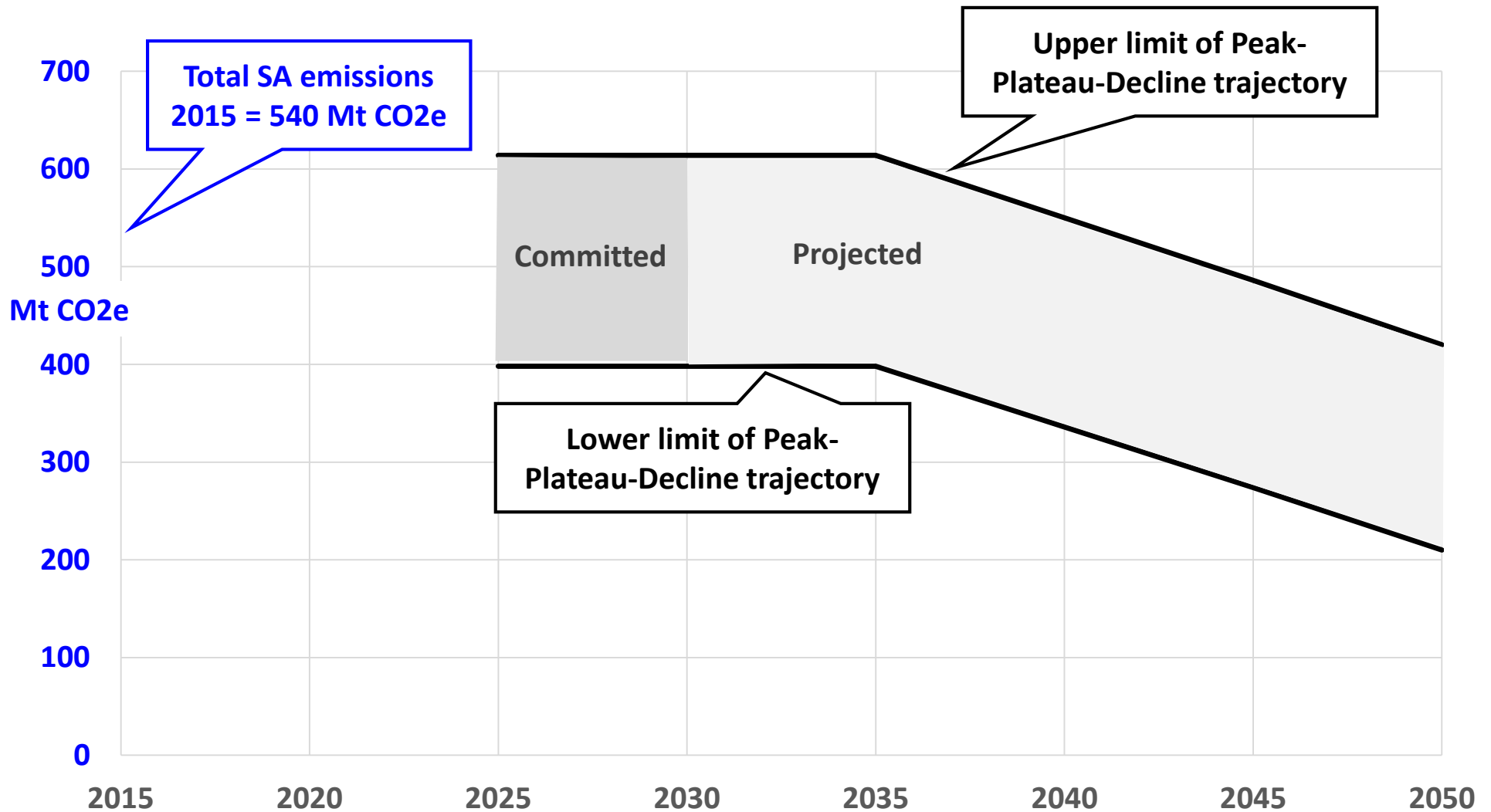
Climate Action Tracker** rates SA's NDC (Nationally Determined Contribution) in 2030 as "highly insufficient".

If all countries were to follow SA's approach, global average warming would reach over 3°C and up to 4°C (median projection).

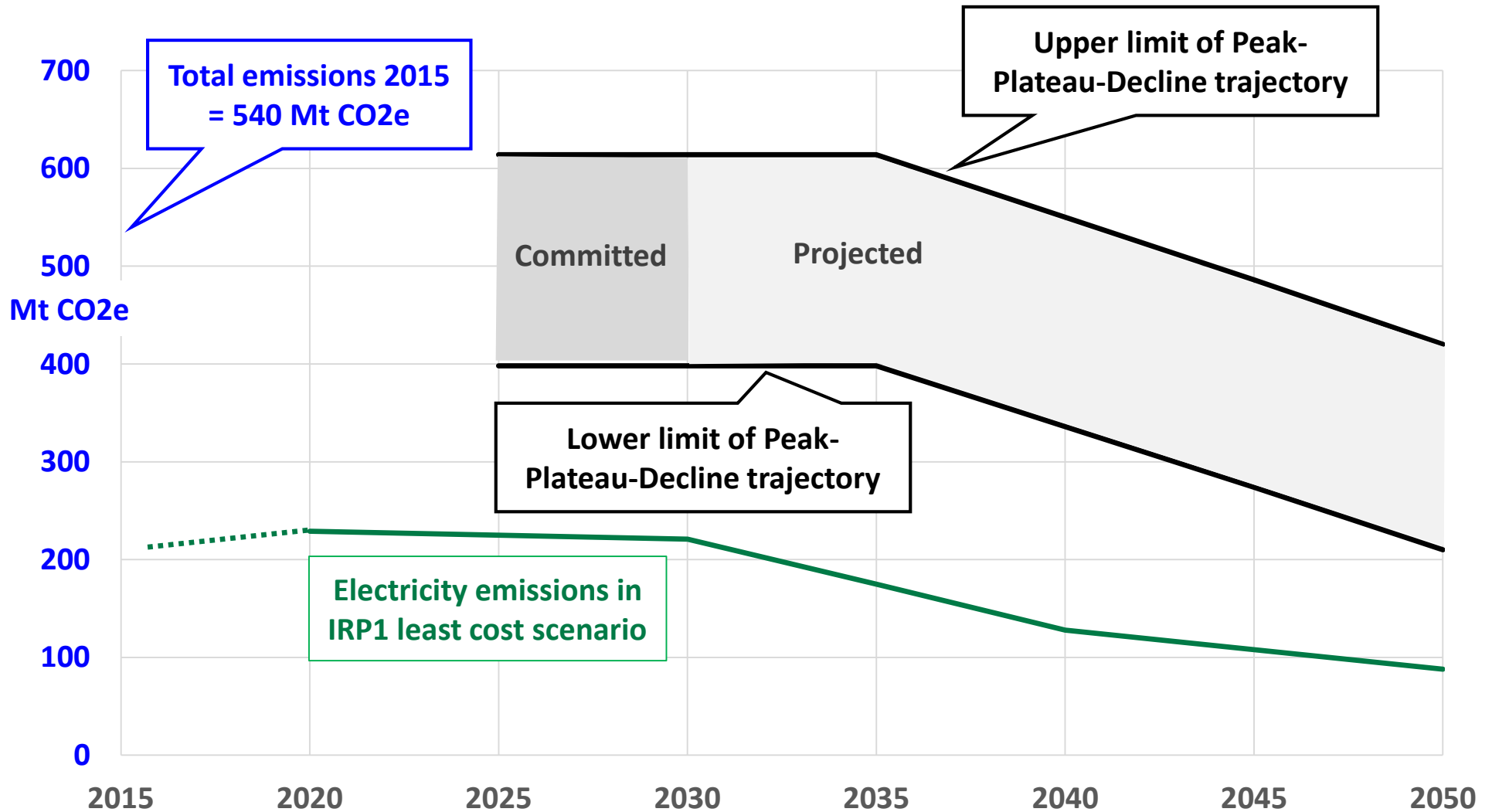
** Climate Action Tracker tracks climate pledges and policies of 32 countries (including SA), covering around 80% of global emissions, including all the biggest emitters.

<https://climateactiontracker.org/>

5. Decarbonisation of electricity as per IRP 2018 is part of the solution

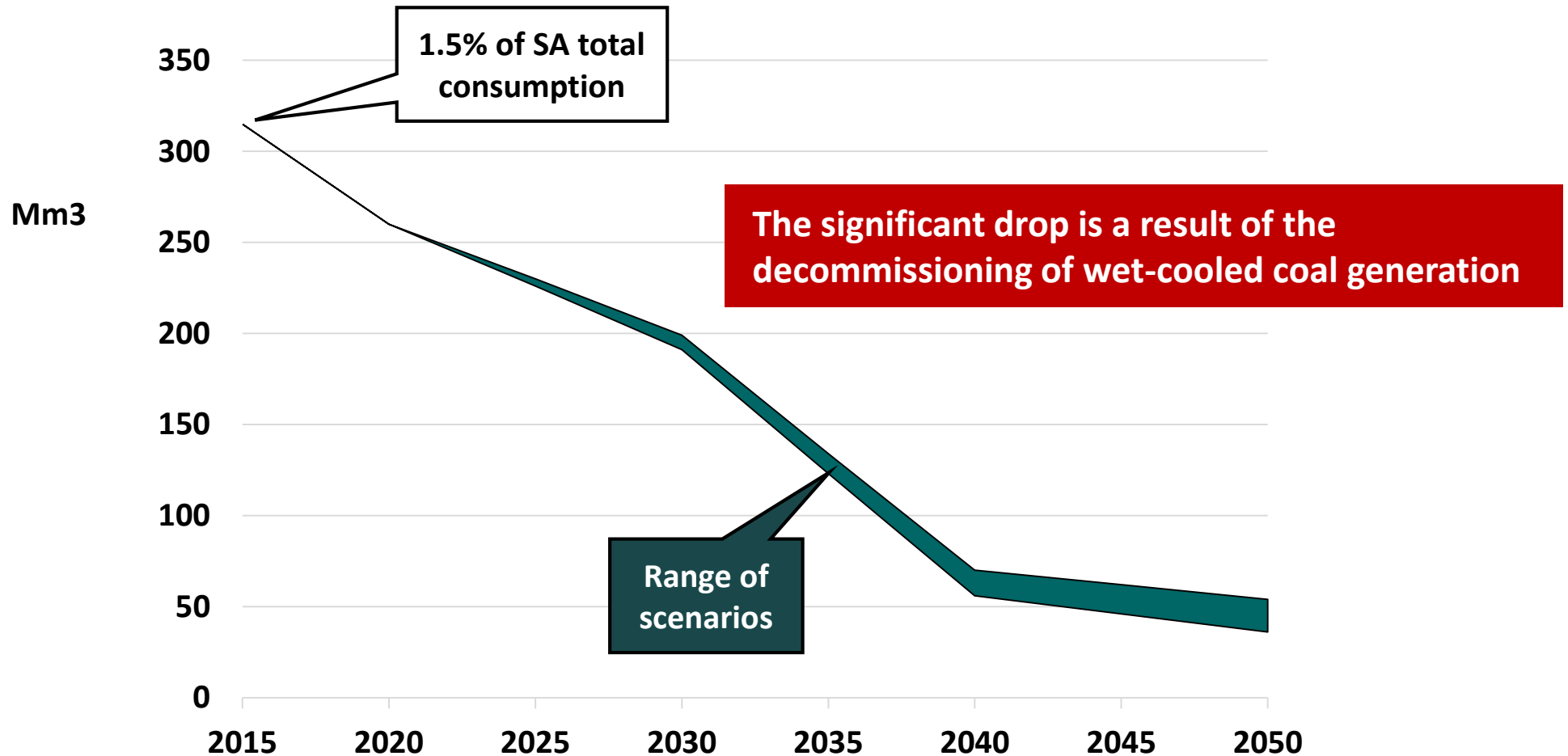


5. Decarbonisation of electricity as per IRP 2018 is part of the solution



6. Water requirements of the IRP

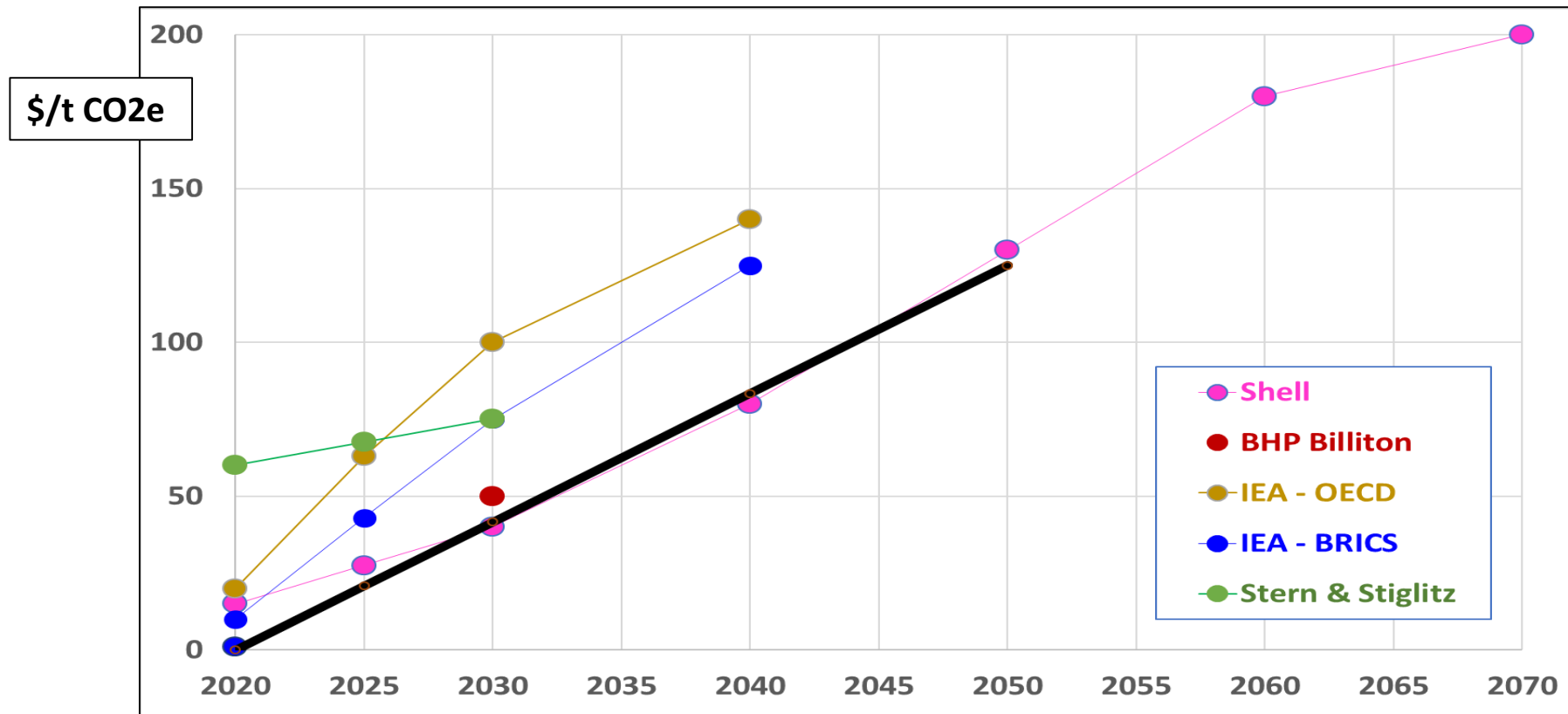
Water consumption for electricity generation drops considerably in all the IRP scenarios



7. Impact of future carbon pricing

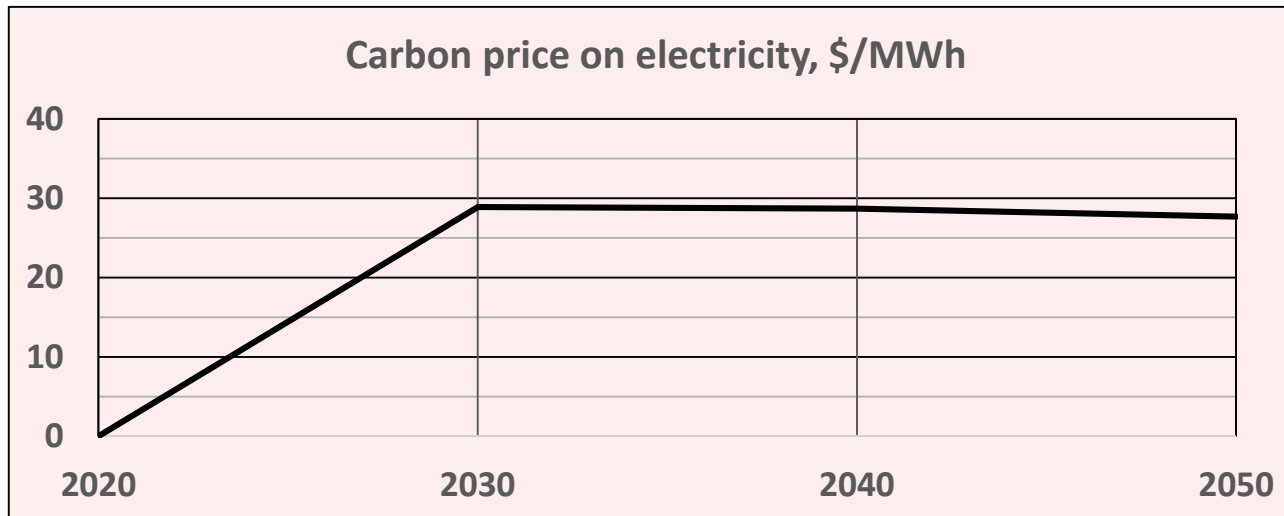
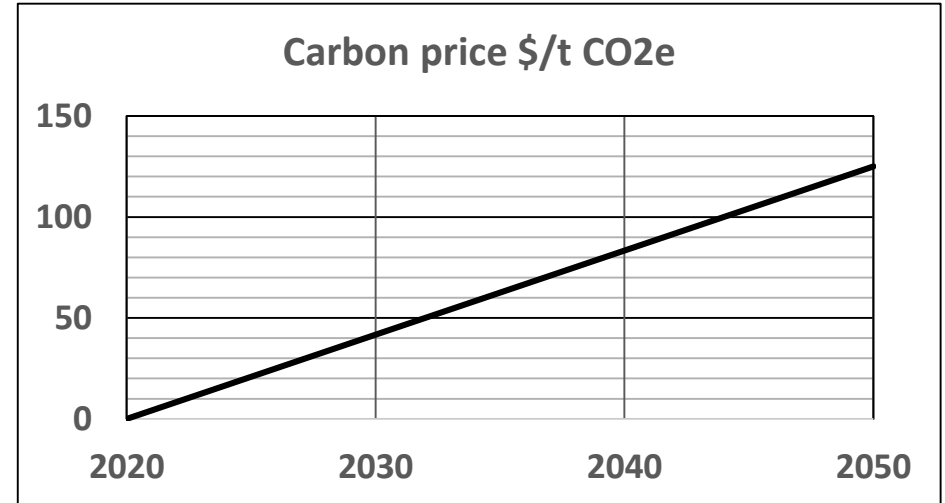
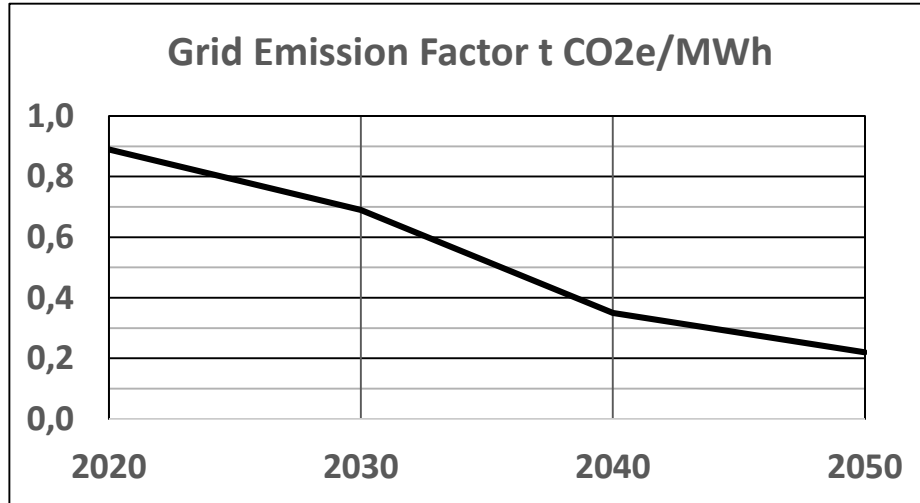
Projections to achieve 2°C max by 2100

SA carbon taxation will be starting at around an effective price of \$3/t CO₂e in 2019?/2020? Future projections are generally much higher:

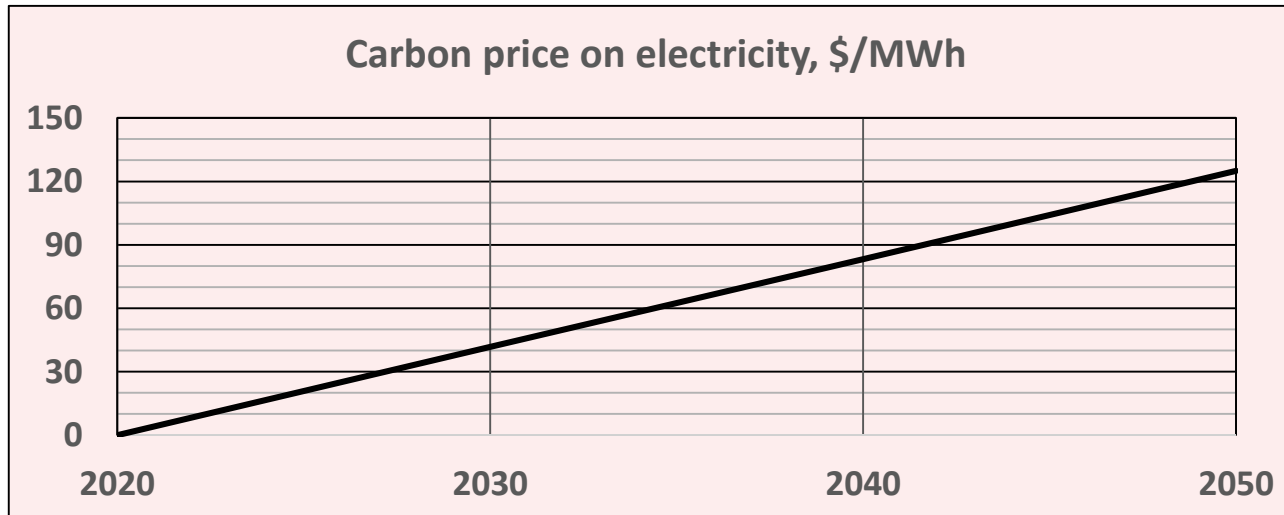
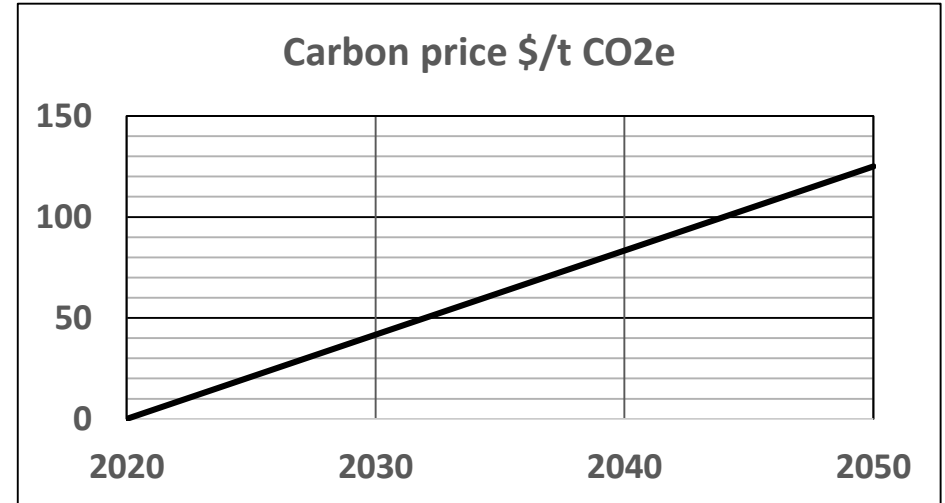
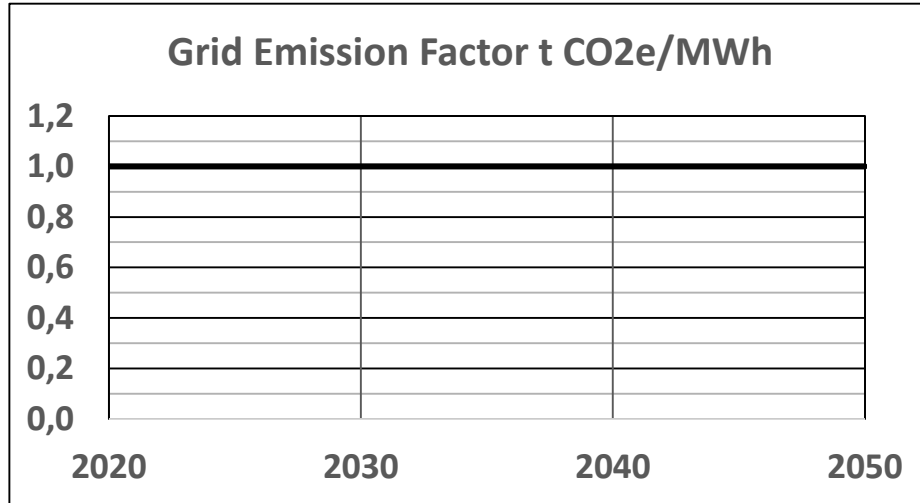


- Shell Sky Scenarios, 2018
- BHP Billiton Climate Change Portfolio Analysis, 2018
- IEA World Energy Outlook 2016
- High Level Commission on Carbon Pricing, Joseph Stiglitz and Sir Nicholas Stern, 2018

7. Impact of future carbon pricing on South African electricity price: IRP1



7. Impact of future carbon pricing on South African electricity price: current mix



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The image contains five logos arranged in two rows. The top row features SAPVIA (South African Photovoltaic Industry Association) and ee publishers. The bottom row features SAREC (South African Renewable Energy Council), SAIEE, and SAESA (South African Energy Storage Association).

**Draft IRP 2018 Workshop
and Stakeholder engagement**