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NEW ZEALAND AGRI-BUSINESS ADVISORS

“Carbon Neutral Project” – The Farmers

King Country River Care

7/16/2024

Turner “Base” system

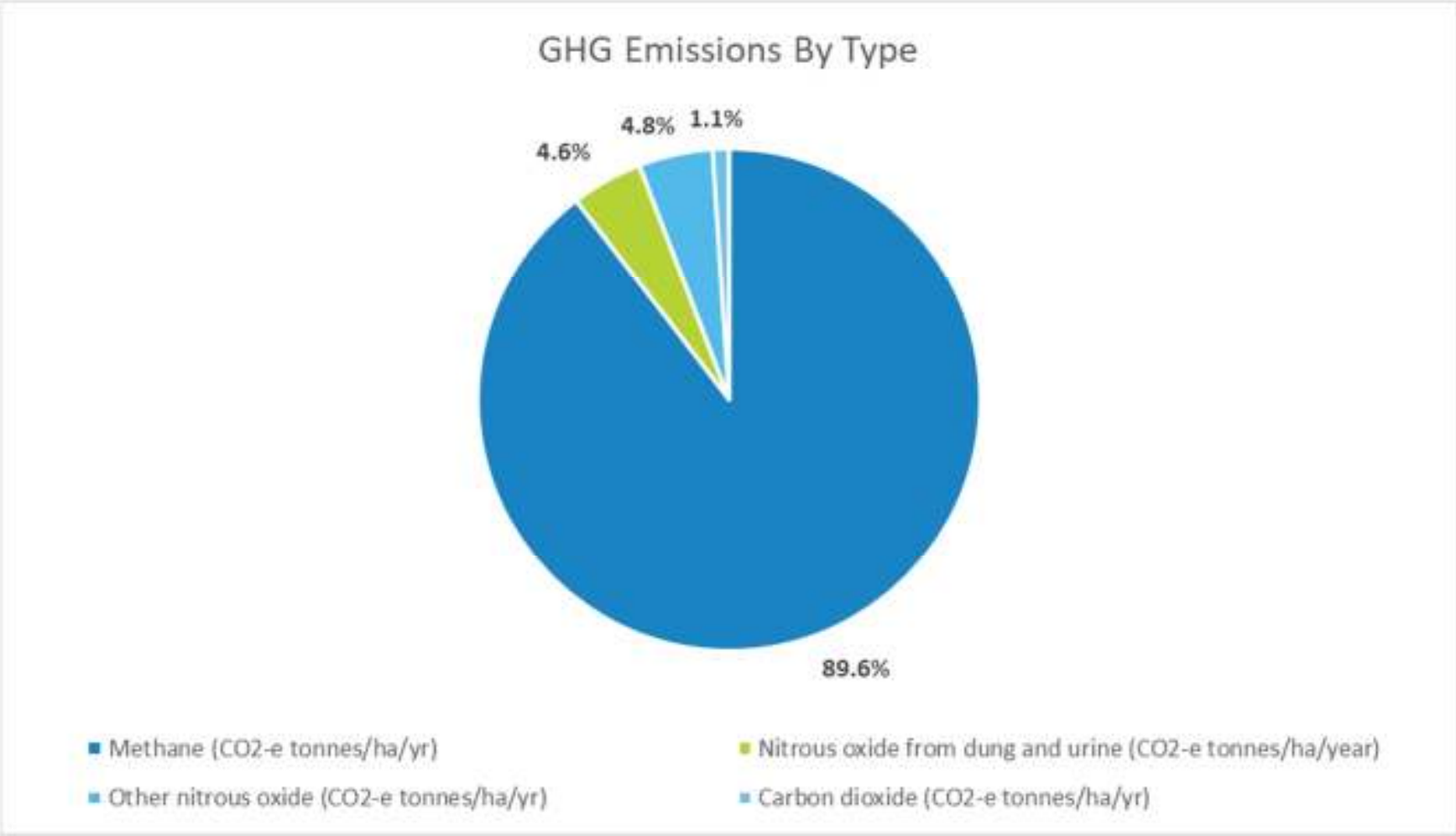
- Related to what Stephan has described with key points being:
  - 381 ha pasture and bush.
  - Approximately 287 ha of pasture.
  - Sheep – 1,100 ewes, 340 replacement ewe hoggets, and 100 sale hoggets.
  - Cattle – 75 VIC cows & heifers, 108 R1 steers and heifers, and 60 autumn born yearling bulls.
  - Buy in approximately 60 autumn born weaner bulls, 15 autumn born weaner heifers, and 28 R1 dairy beef steers.
- Meat (carcass) and fibre production of 243 kg/ha
- Farmax farm operating (EBITRD) profitability of $104,000 - $363/pasture ha and $1.50/kg of meat and fibre product.
- Sequestration (tonnes CO_2) modelled to occur from:
  - None from 78 ha of older bush;
  - 9.0 ha of pine at 22.1 tonnes CO_2/ha/year; and
  - 6.1 ha of hardwoods at 27.2 tonnes CO_2/ha/year.
  - Total of 364.8 tonnes CO_2 sequested per year.

The base system - emissions

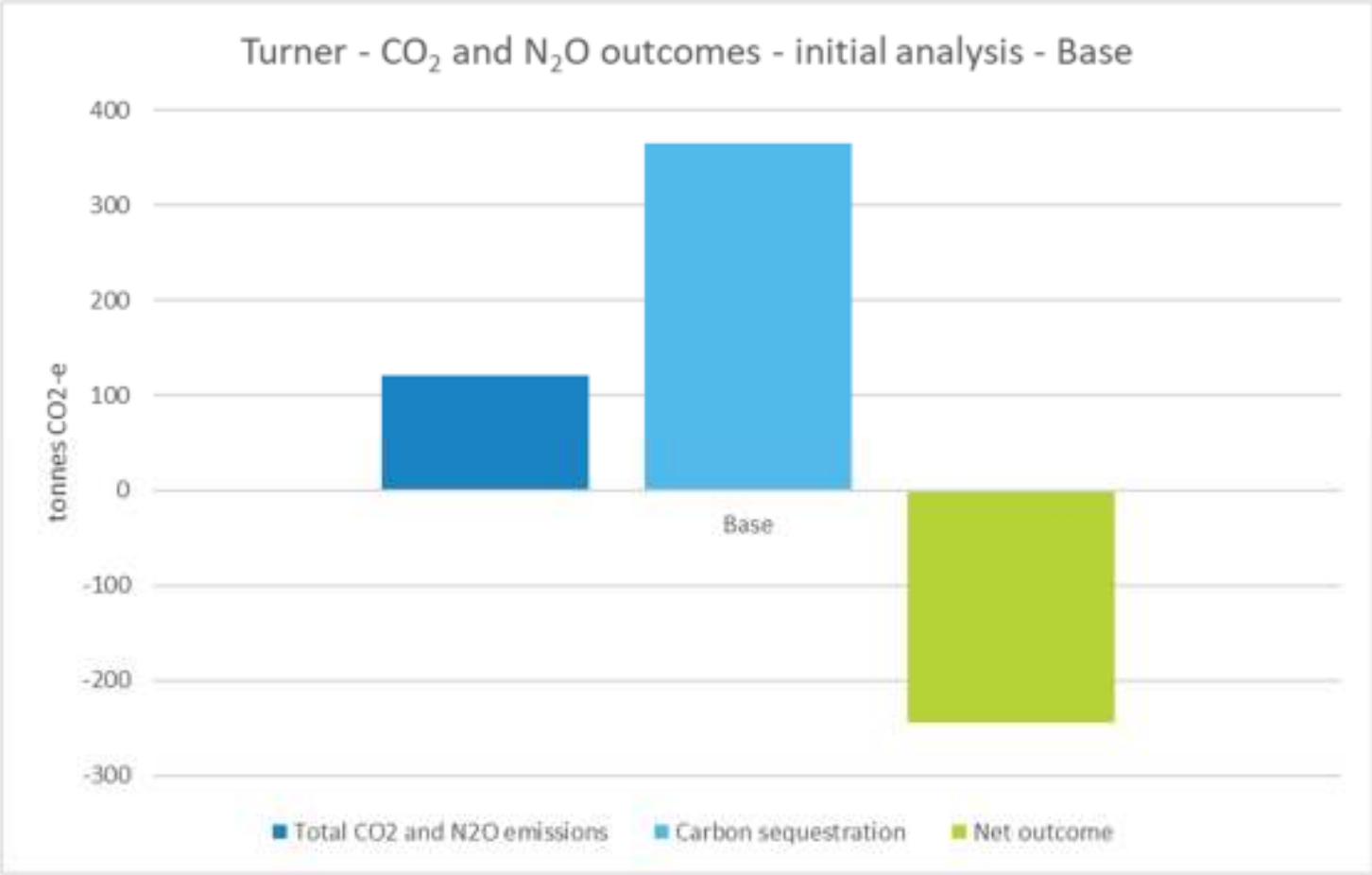
Emissions Summary		
Methane (CO2-e tonnes/ha/yr)	2.73	"Average sheep and beef farm emitting **3.6** tonnes CO_2/ha/yr". [1.]
Nitrous Oxide (CO2-e tonnes/ha/yr)	0.29	
Carbon Dioxide (CO2-e tonnes/ha/yr)	0.03	
Total GHG emissions (CO2-e tonnes/ha/yr) - Scope 1 and Scope 2 only	**3.04**	
Emissions from livestock		
Methane	90%	
Nitrous oxide from dung and urine	49%	
Proportion of GHG emissions from livestock	94%	
Other Contaminants		
Nitrogen Loss (kg/total ha)	21.6	
Phosphorous Loss (kg/total ha)	2.67	
Intensity		
Total long-lived gas (Scope 1 and Scope 2) emissions (excluding biogenic methane) per kg of meat and wool (kg CO2-e/kg product)	1.74	
Total Methane (Scope 1 and Scope 2) emissions per kg of meat and wool (kg CH4/kg product)	0.60	
Nitrogen loss per kg of meat and fibre produced (kg nitrogen/kg meat and fibre)	0.12	

[1.] https://www.agmatters.nz/farm-types/sheep-and-beef/

The base system - emissions



CO_2 and N_2O – Base result



The scenarios – summary table of differences

Scenario Differences	Base	Scenario 2	Scenario 3	Scenario 4
Pasture area	287 ha	282 ha	279 ha	269 ha
Bush and other retired areas	78 ha	78 ha	78 ha	78 ha
Planted area - existing pines and hardwoods	15.1 ha	15.1 ha	15.1 ha	15.1 ha
New native	0.0 ha	1.0 ha	1.0 ha	1.0 ha
New Douglas Fir/Redwoods	0.0 ha	3.5 ha	7.2 ha	7.2 ha
New Pines	0.0 ha	0.0 ha	0.0 ha	10.0 ha
Ewes	1,100	1,100	1,000	1,000
Ewe hoggets	340	340	280	280
Sale hoggets	100	0	0	0
Cows	75	50	0	0
Replacement heifers	15	10	0	0
R1 Steers and heifers	93	130	120	120
Autumn born yearling and R1 bulls	60	108	140	140
R2 steers	0	0	55	55
Breeding bulls	3	3	0	0
Total Stock Units	3,085	2,986	2,851	2,851
SU/ha	10.75	10.57	10.23	10.61

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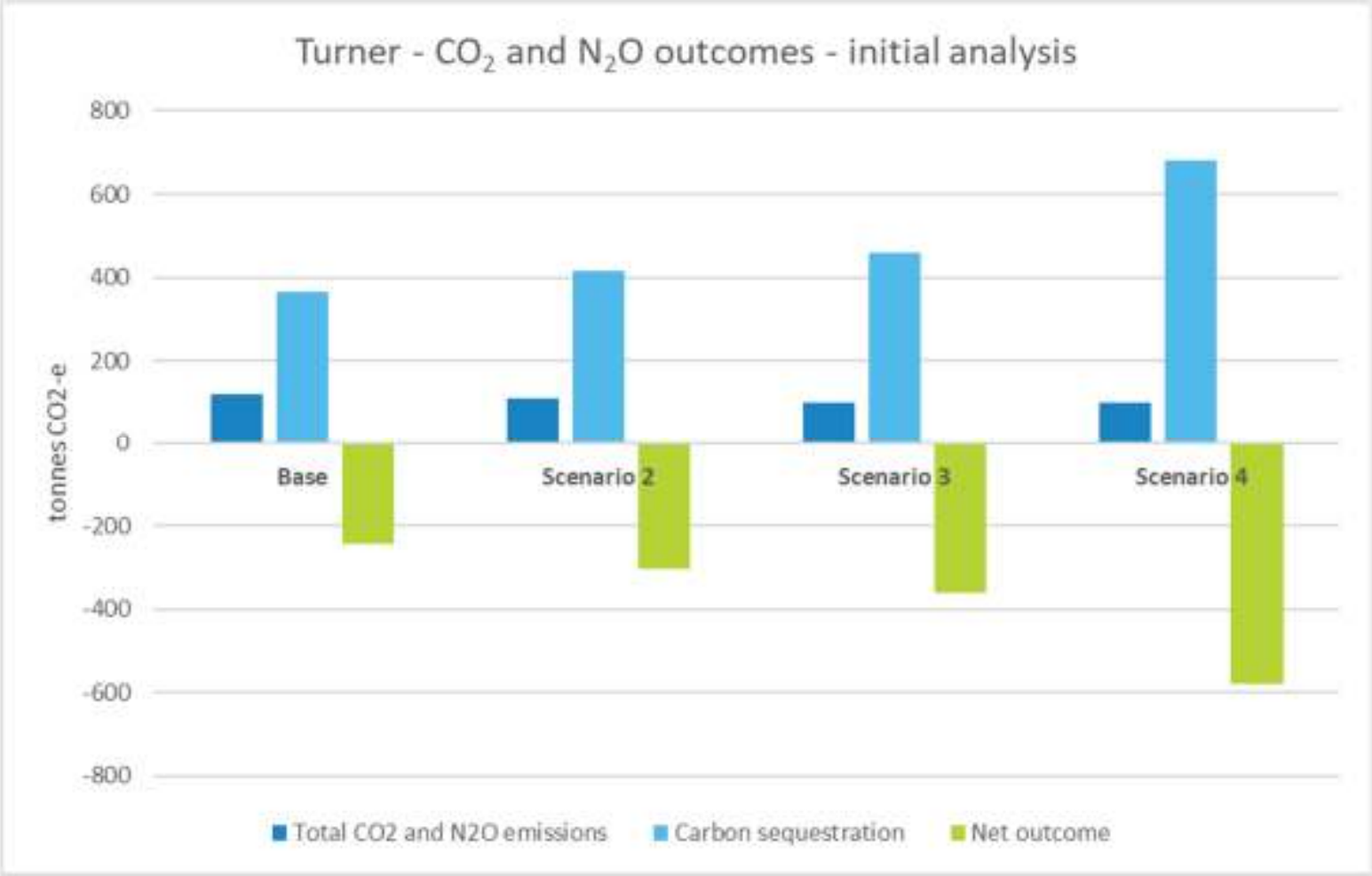
Lambing % ex ewes (STS)	145%	145%	147%	147%
Lambs from ewe hoggets	257	257	212	212
Lamb carcass weight (kg)	16.1	15.9	15.8	15.8
Number of steers and heifers sold store	92	129	64	64
Average steer and heifer sale lwt (kg lwt)	385	364	358	358
Number of steers finished	0	0	55	55
Average steer carcass weight (kg)	0	0	319	319
Number of bulls finished	60	60	80	80
Average bull carcass weight (kg)	310	310	308	308
Cattle purchased (excluding breeding bulls)	-105	-159	-204	-204
Total meat and fibre production	69,594	69,159	71,586	71,586
Meat and fibre/ha	243	245	257	266

Changes to CO_2 and N_2O



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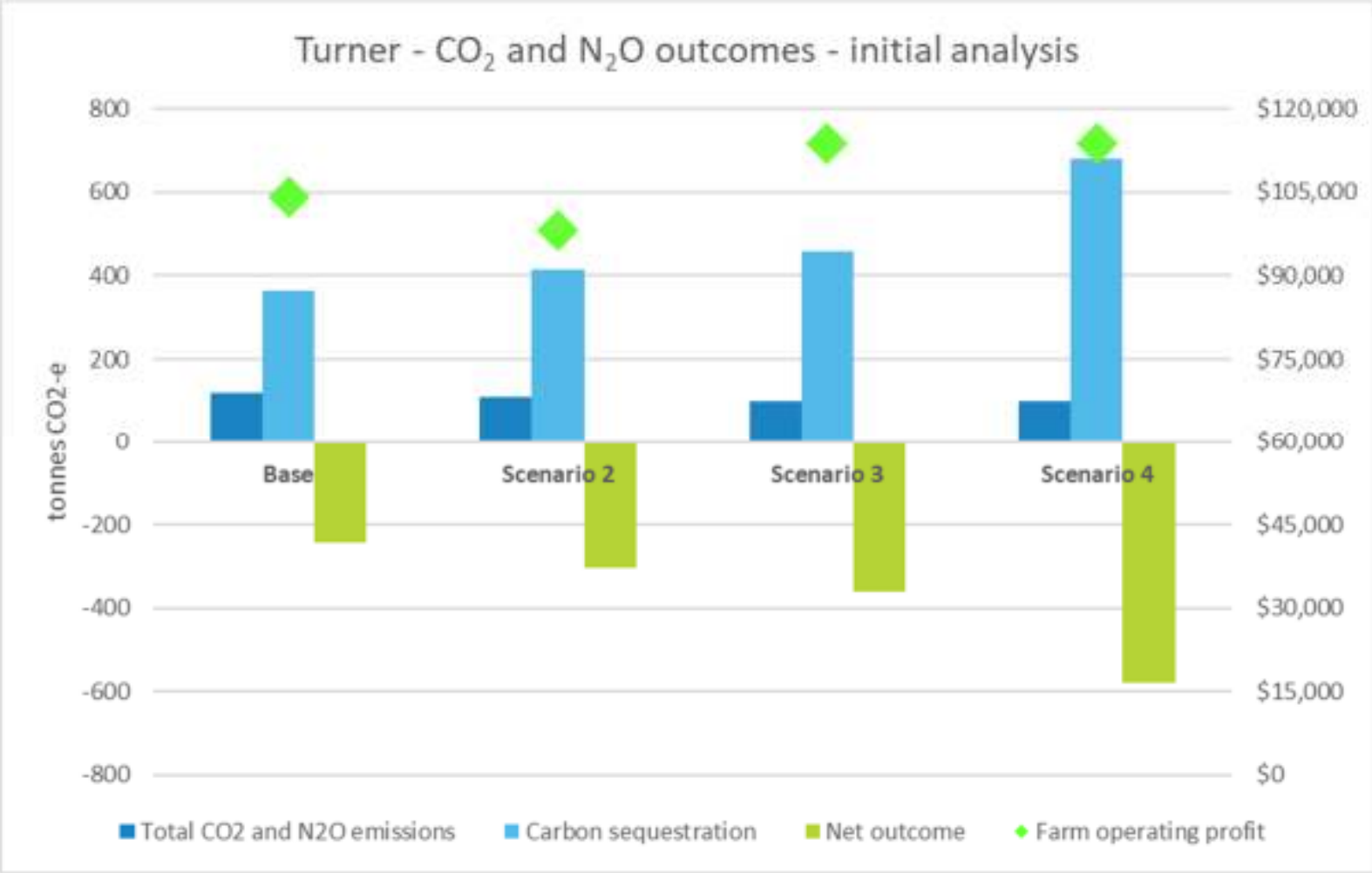

Changes to CO_2 and N_2O

- There will be net-zero carbon dioxide and nitrous oxide emissions options (under the project parameters) for this farm operation.
- There are options available that will increase profitability and be more carbon positive.
    - This is farm policy and farm land-use specific.
- Subject to confirming age and type of tree it is possible that the operation is “carbon neutral” now – based on excluding biogenic methane.
- In other situations, under current rules, it may take an investment in planting to either create or increase on-farm sequestration to achieve the net-zero position.
- But it is a “jig-saw” … different trees and it takes time for the sequestration to semi- stabilize.

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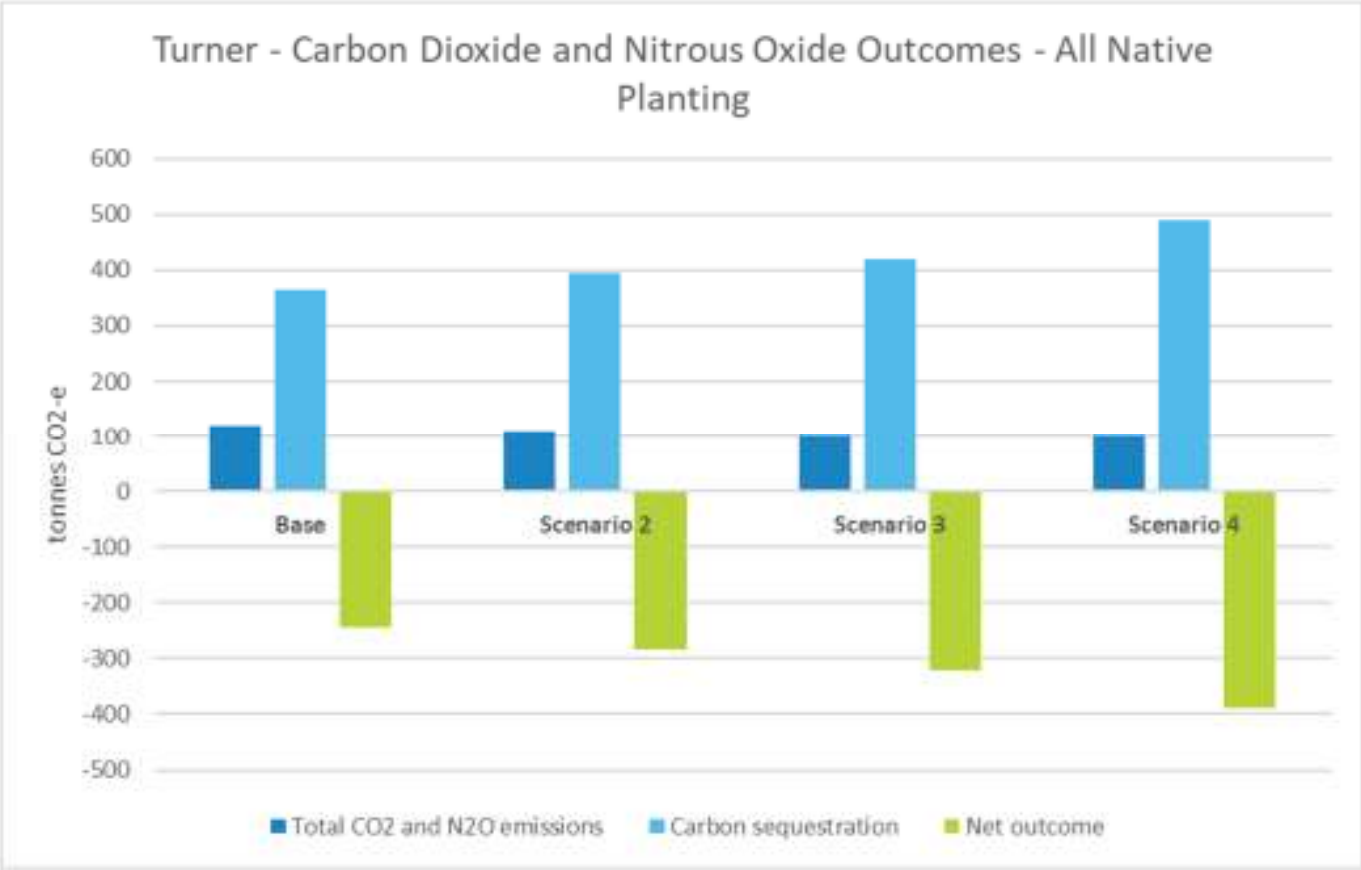

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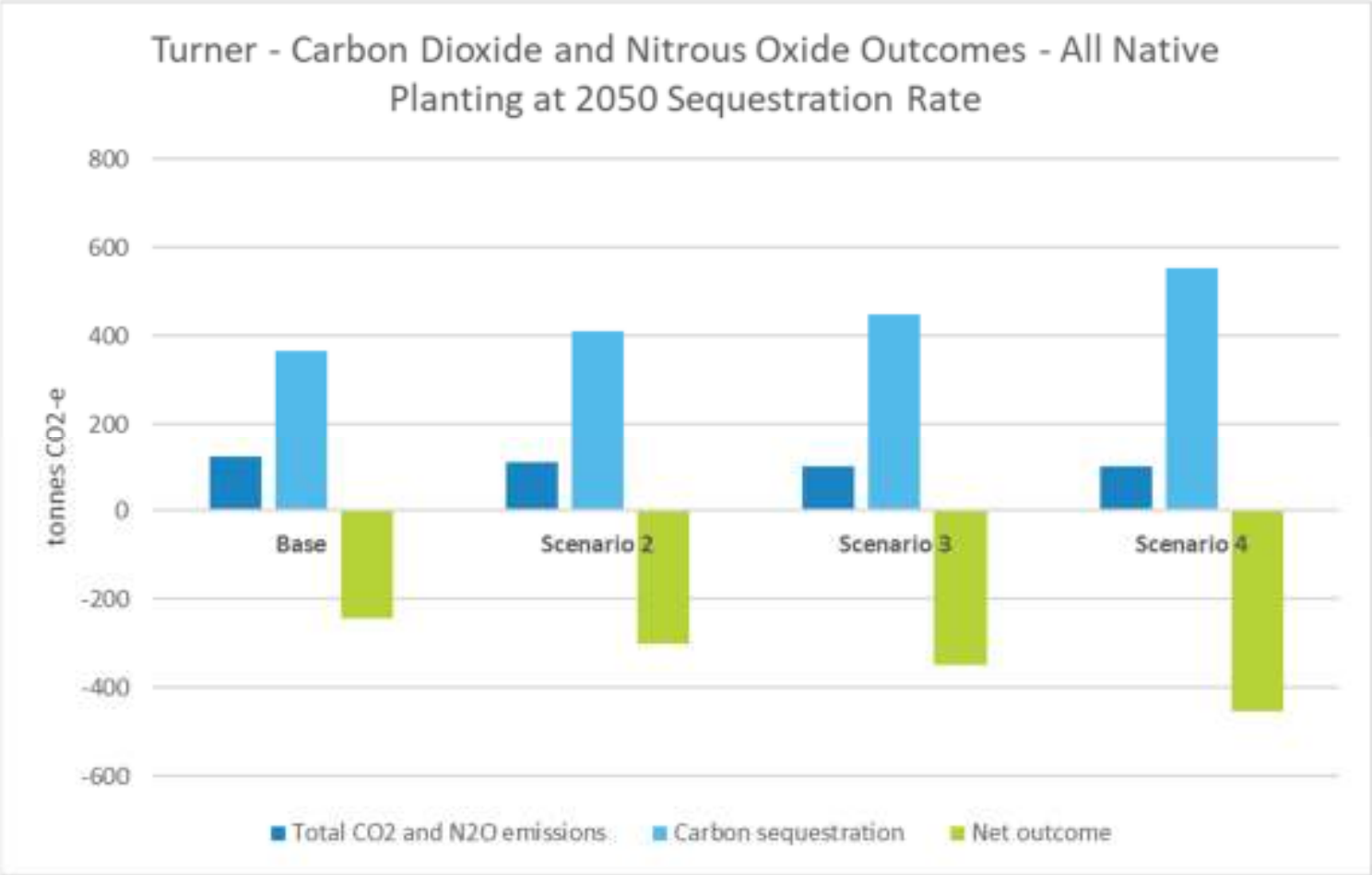
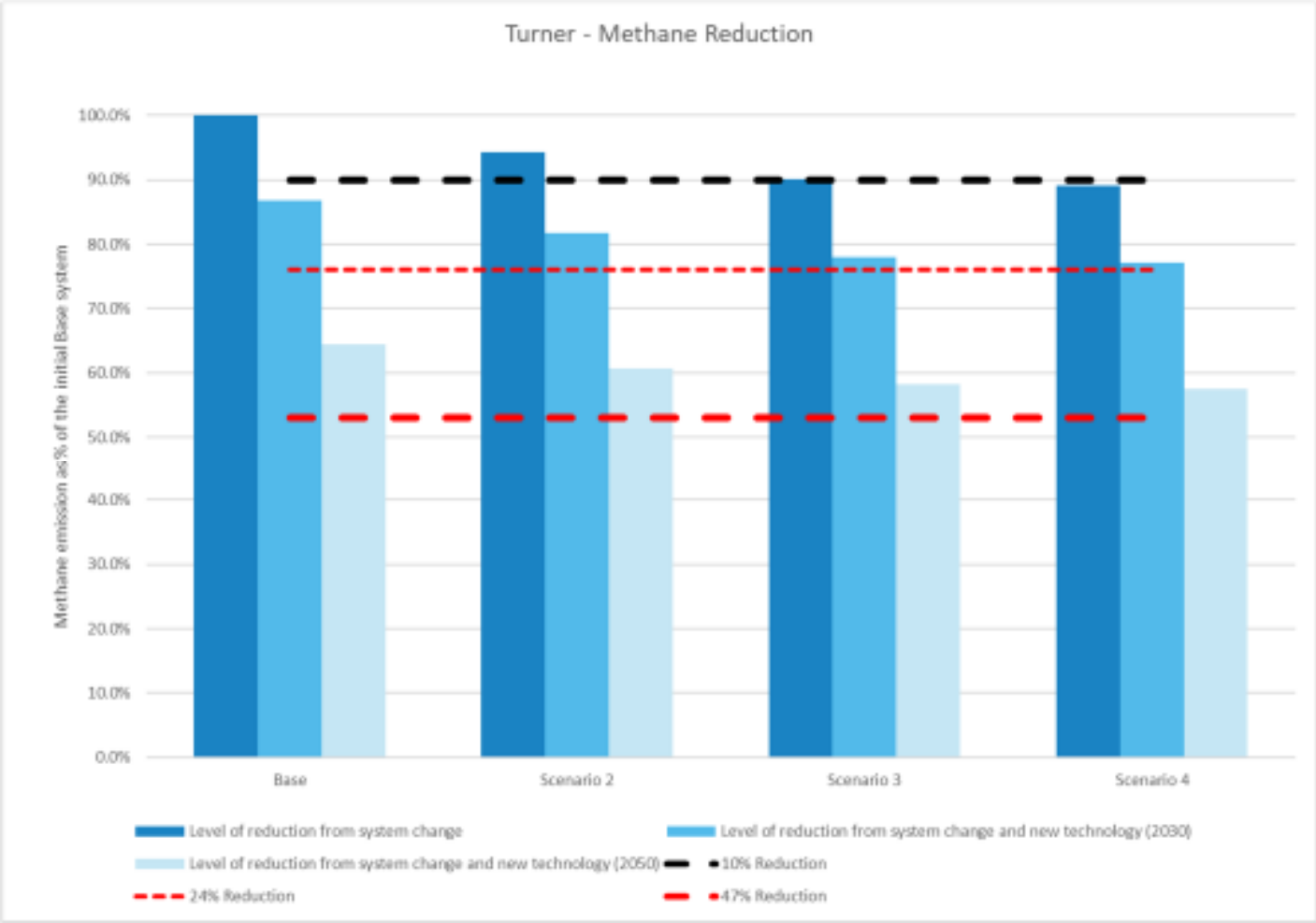


Methane Results

- The results are all about comparisons to the current agriculture sector targets of:
    - 2030 target of minus 10%;
    - And 2050 target of between minus 24% and minus 47%.

Methane results



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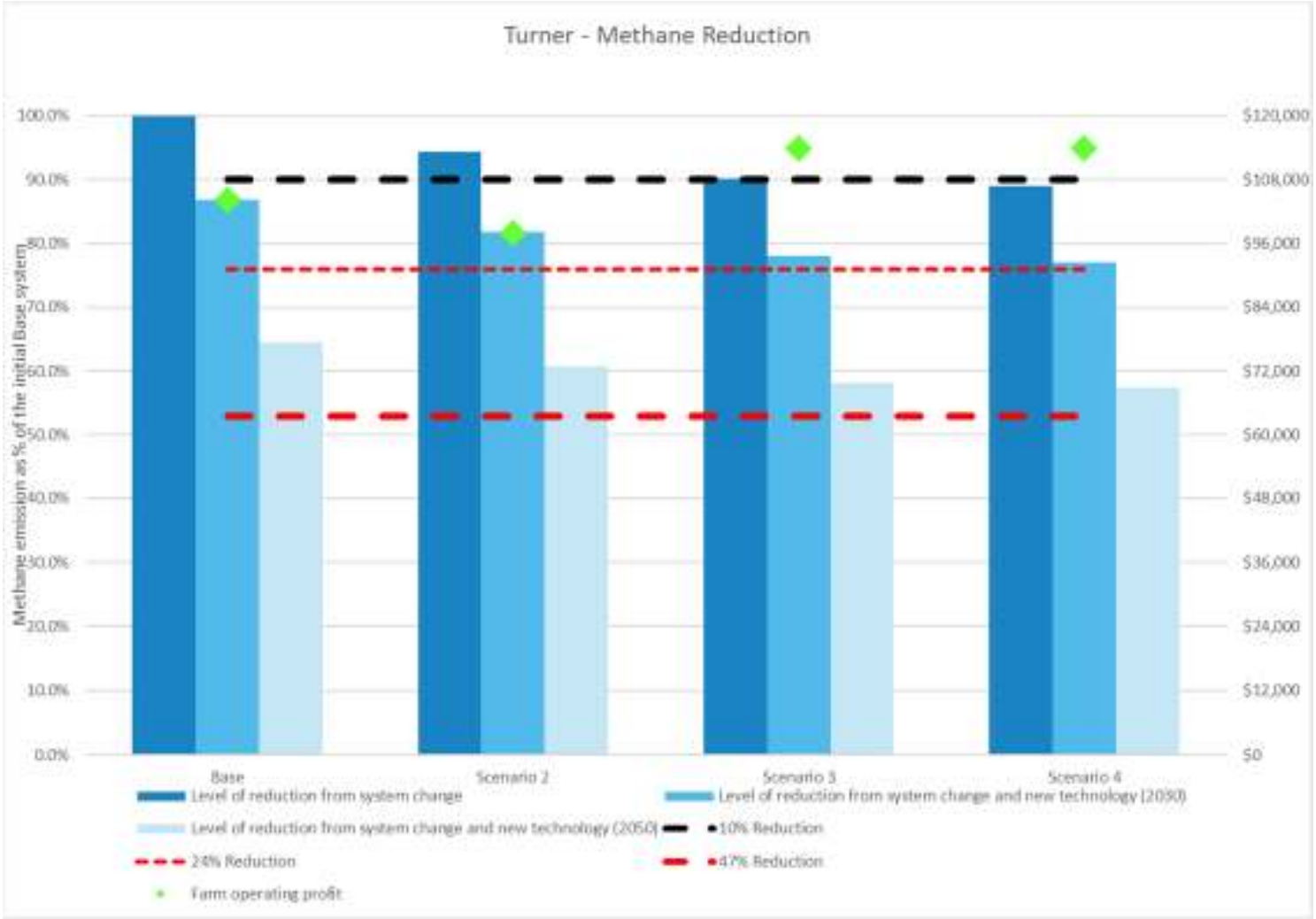
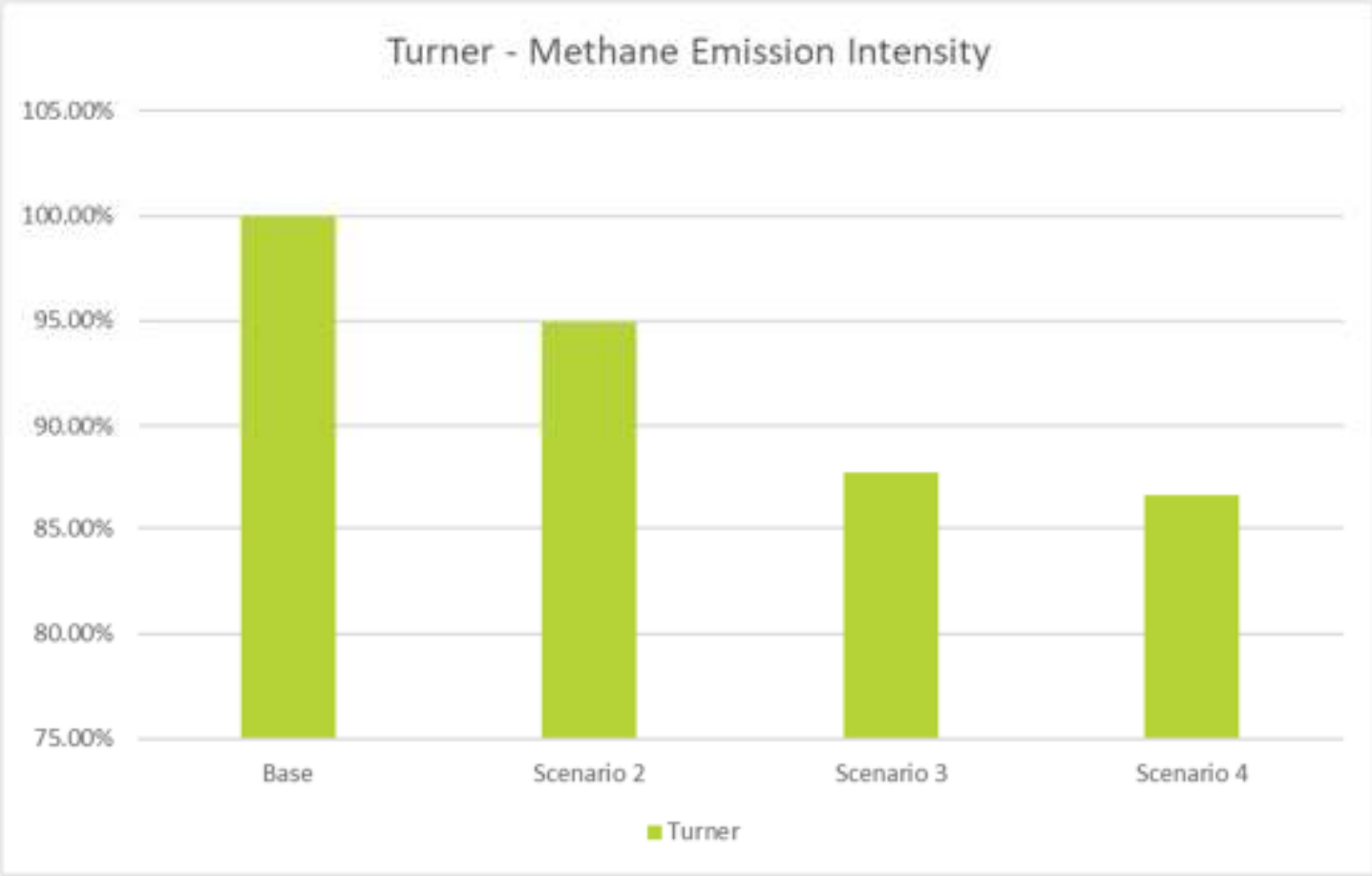


Emissions intensity - methane



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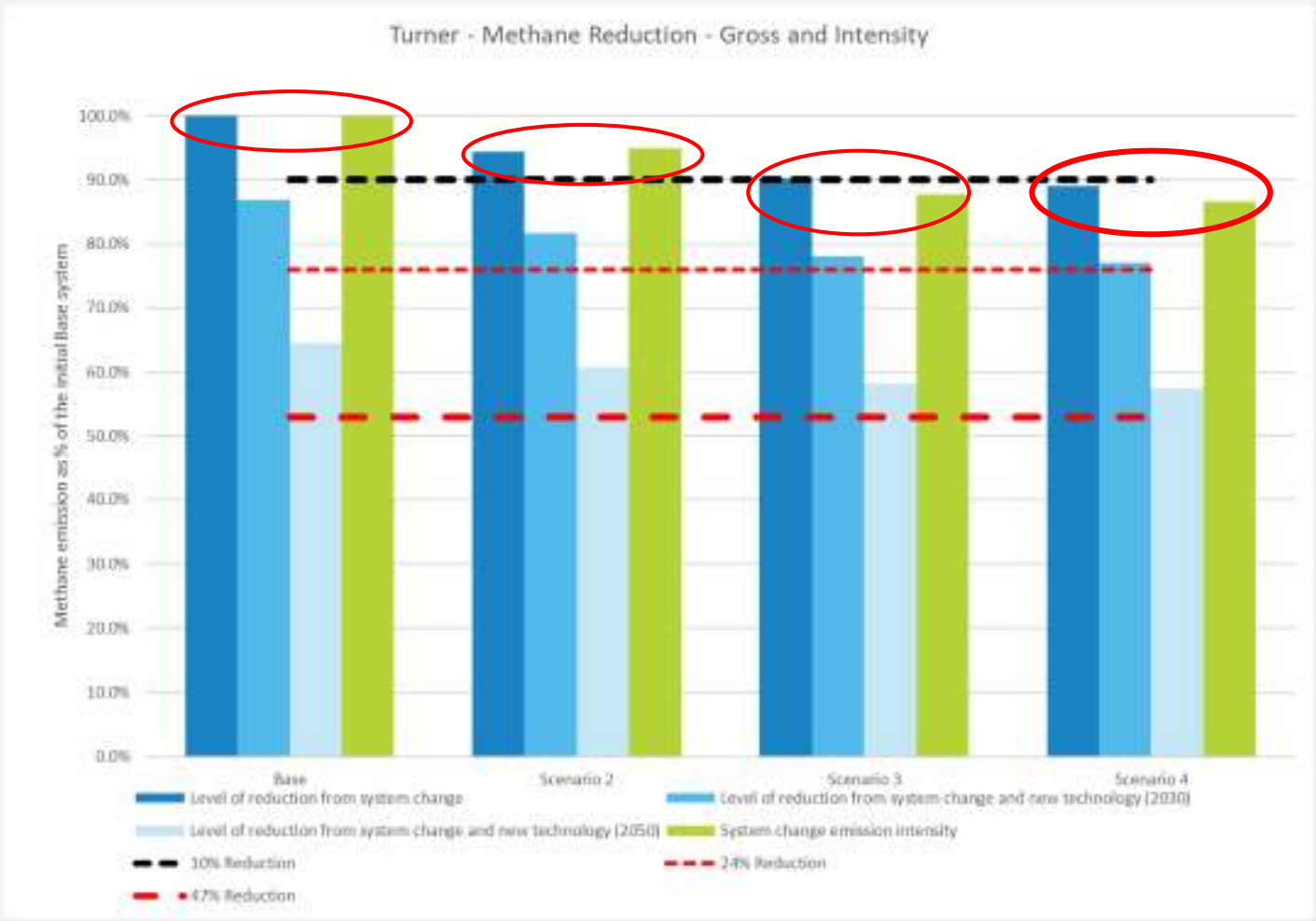
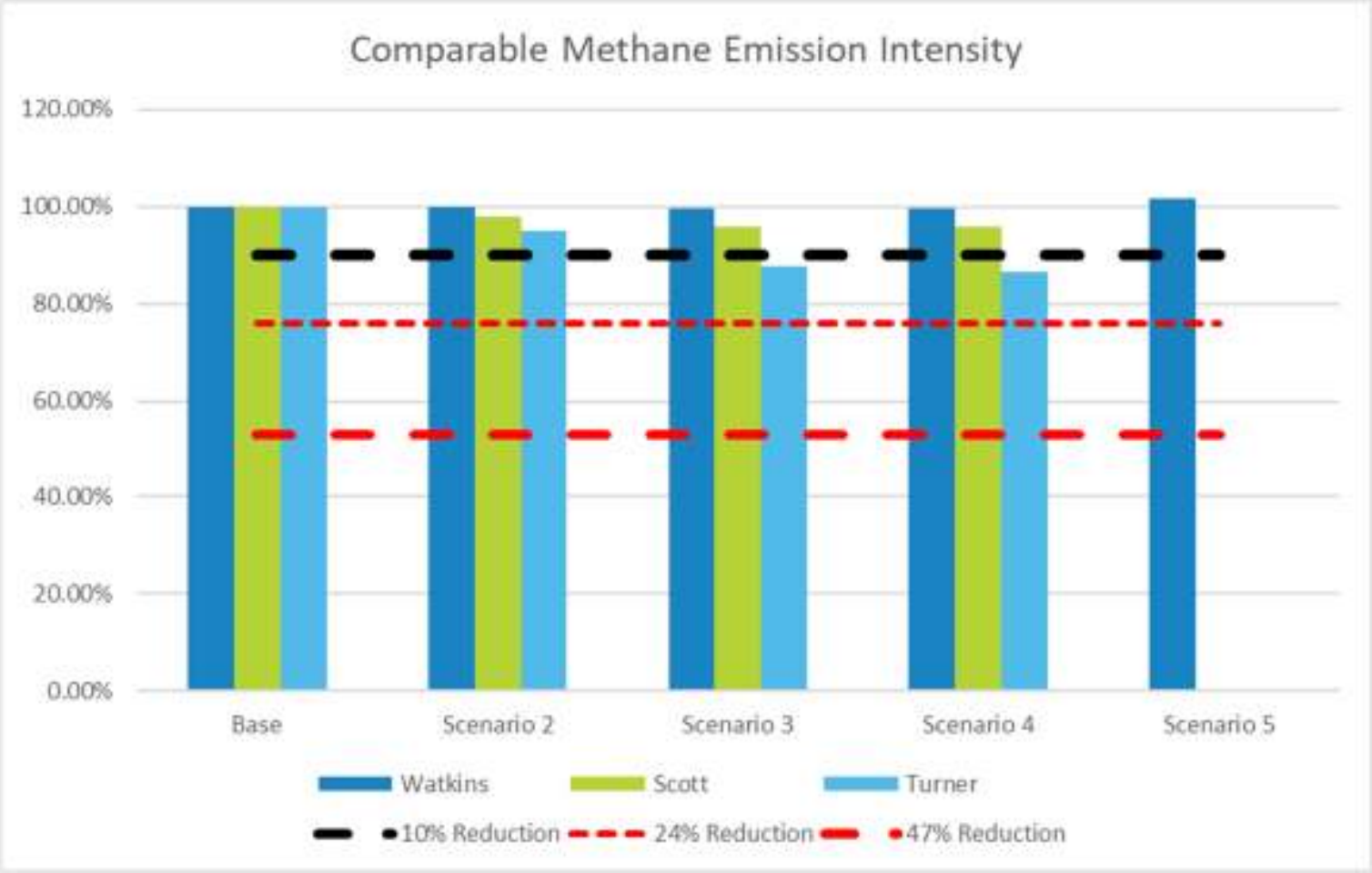
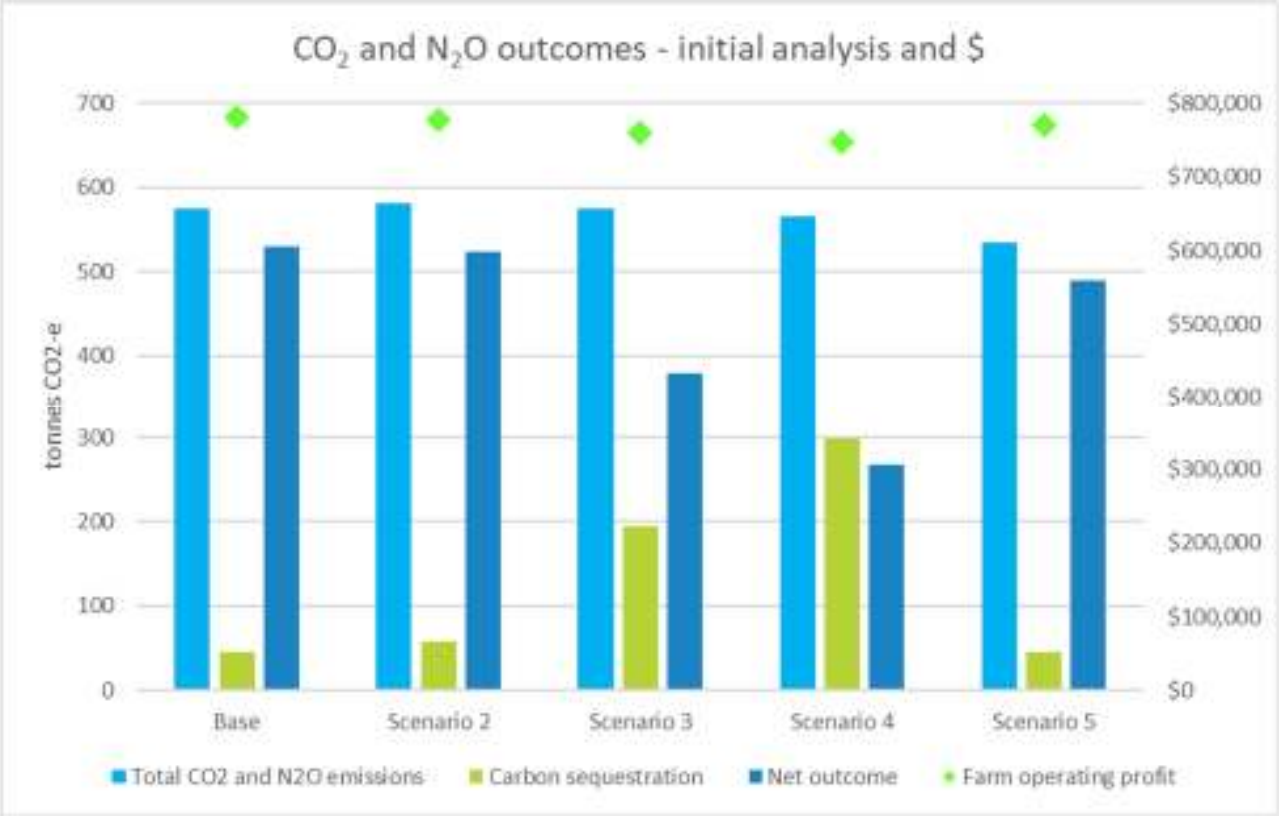


Other farmer methane intensity



Other farmer results - Watkins

- Watkins – 365 ha dairy operation with 265 ha milking platform, 95 ha runoff/other pasture, 18 ha other, with an existing 7 ha contributing to sequestration and 35 ha bush and retired areas not contributing.



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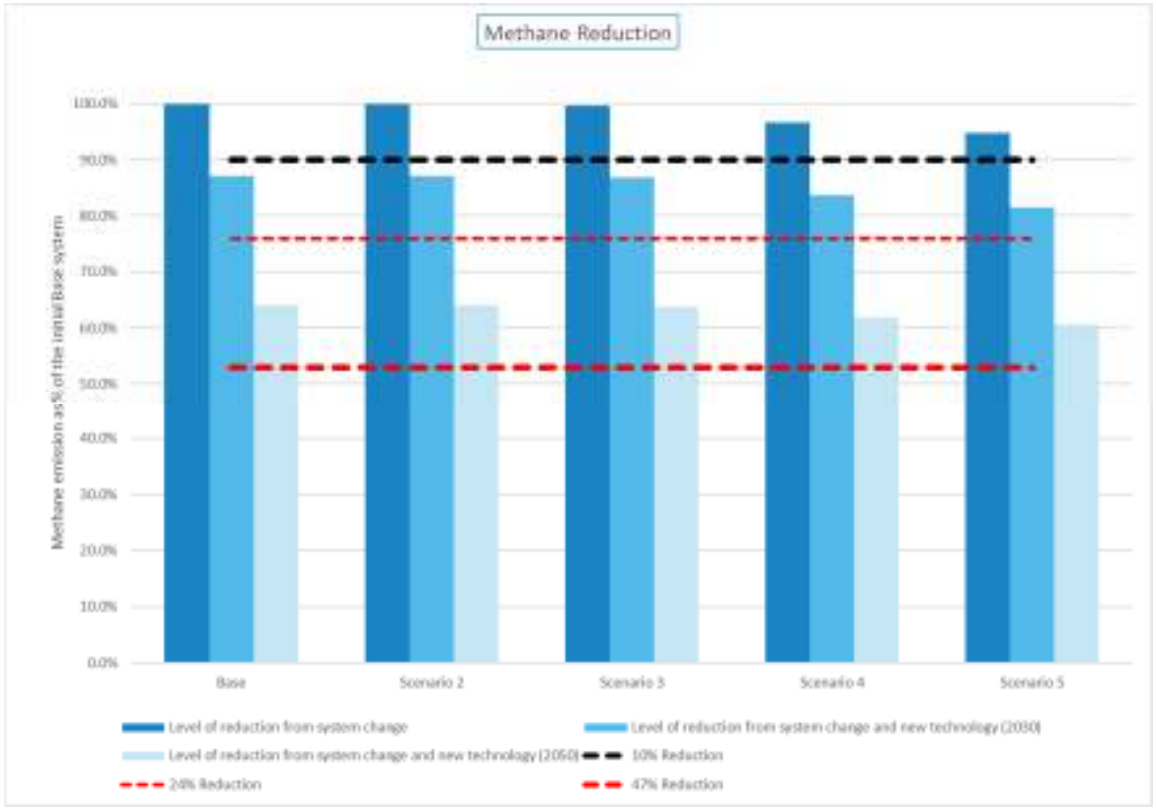
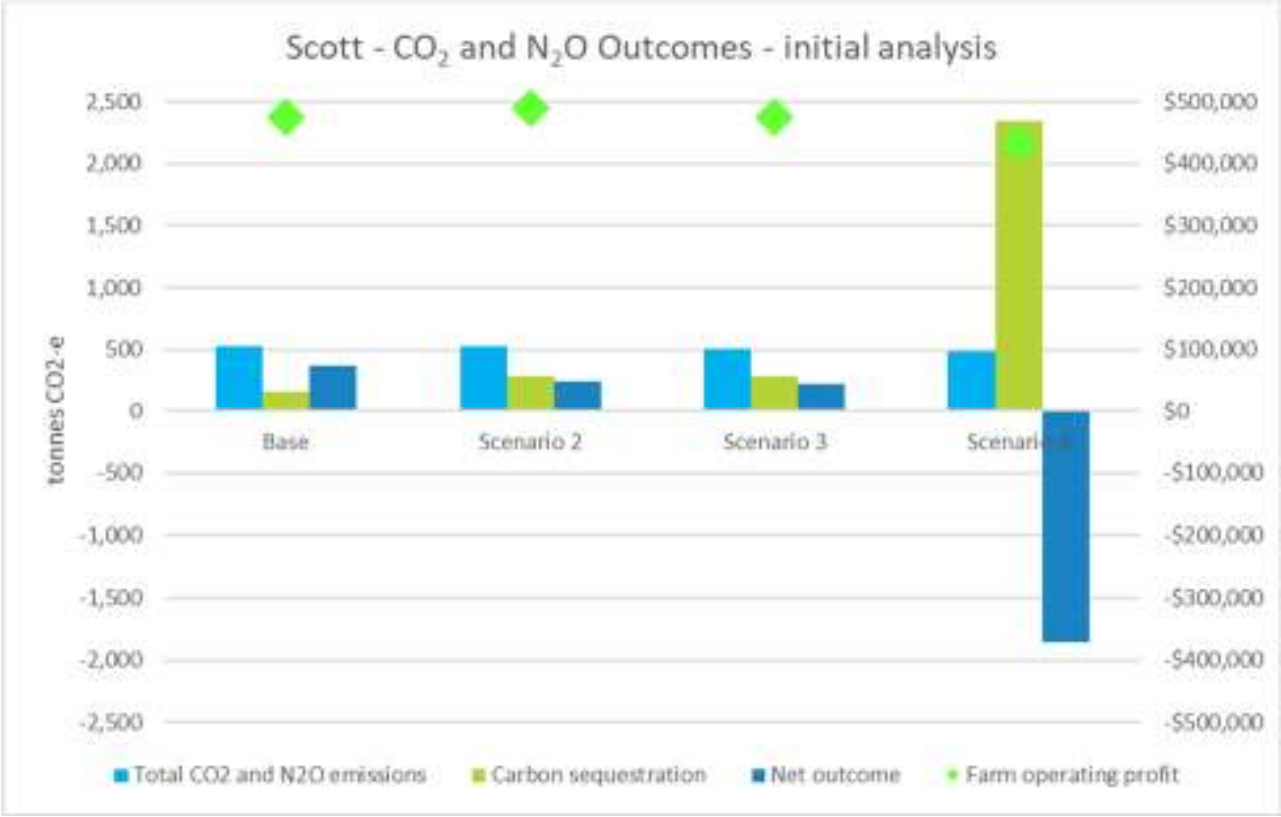


Other farmer results - Scott

- Scott – 1,636 ha sheep and beef property with existing 12 ha contributing to sequestration and 139 ha bush and retired areas not contributing.



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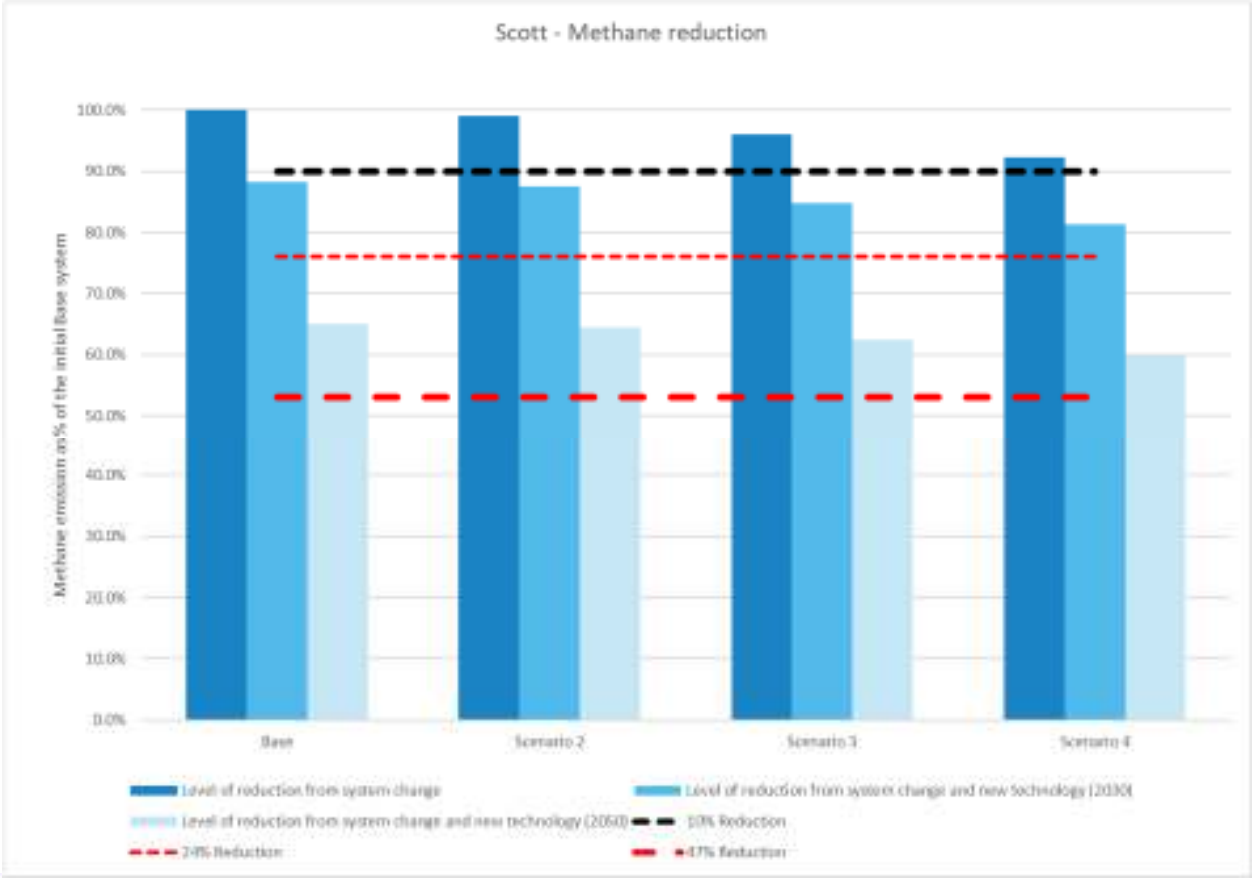

Conclusions

1. Excluding bio-genic methane it is possible to make changes that result in **a net-carbon zero emissions position**.
2. You **maybe in that position now** – this will depend on the area and type of vegetation you have on hand, and what is determined as an allowable rate of sequestration for each different block of vegetation.
3. A reduction in gross methane emissions will require a reduction in feed used – changes that result in **less pasture grown** and/or less feed imported onto the farm.
4. Trees – new trees/vegetation have a role to play, there is flexibility, can be "right tree in the right place" approach.
5. **Unless** you are **dramatically changing** your feed use level, achieving the agriculture sector reduction targets on an individual farm will most likely require the use of **new "lower methane genetics"** and/or the **successful development and use of** new vaccine/inhibitor technology.
6. You can **start a methane emissions reduction plan now**. This will most likely be for your customers (namely our processors) and debt access advantages. There will be a focus on methane emissions intensity and gross methane emissions. If your emissions intensity is improving, you may not have to reduce your gross emissions.
7. BUT … the possibility of a **cost being applied to (all?) methane emissions has not gone away**.

What the hell might I do now?

1. **Calculate and record your total net meat and fibre production.**
2. You should choose a method of calculating your GHG emissions – which means which model and who – including you! You may have an existing regulatory requirement that this can be linked too.
3. MPI was (and is) building a model for pending regulatory requirements – but in the meantime …?
4. **Understand your existing non-pasture vegetation:**
   - Mapping for areas and locations;
   - Description by age and type;
   - Possible contribution to sequestration; and
   - Remember – probably can only "sell it once".
5. **Keep learning** about this issue:
   - There is unlikely to be a magic bullet that makes it go away completely; and
   - In the future it will likely link into other considerations – freshwater management and biodiversity.
6. Ask about what is involved to get premium for your product or a discount on your loan – or is it just the new BAU?
7. Listen out for what is happening in the industry and regulatory space. Please contribute your thoughts to that process.

Thank you to …

- Our three project farming families – Watkins, Scott and Turner.
- Project and field-day sponsors:

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