Management options facing ocean acidification

Raphaël Billé, SPC

Pacific Islands Regional Ocean Acidification Workshop
7-9 October 2015
Auckland, New Zealand

OCEANS 2015 INITIATIVE

RESCCUE

Restauration of Ecosystem Services and Adaptation to Climate Change

FONDATION BNP PARIBAS

SPC Secretariat of the Pacific Community

CPS Secrétariat général de la Communauté du Pacifique

IAEA Ocean Acidification International Coordination Centre OA-ICC

afd AGENCE FRANÇAISE DE DÉVELOPPEMENT

PRINCE ALBERT II OF MONACO FOUNDATION

AMAO Association Monégasque sur l'Acidification des Océans

FFEM FONDS FRANÇAIS POUR L'ENVIRONNEMENT MONDIAL

Environmental Management (2013) 52:761–779
DOI 10.1007/s00267-013-0132-7

PROFILE

Taking Action Against
of Management and P

REVIEW

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FONDATION BNP PARIBAS

POLICY BRIEF

N°04/15 SEPTEMBER 2015 | CLIMATE - OCEANS AND COASTAL ZONES

Intertwined ocean and climate: implications for international climate negotiations

Alexandre K. Magnan (IDDRI), Raphaël Billé (Secretariat of the Pacific Community), Sarah R. Cooley (Ocean Conservancy), Ryan Kelly (University of Washington), Hans-Otto Pörtner (Alfred Wegener Institute), Carol Turley (Plymouth Marine Laboratory), Jean-Pierre Gattuso (CNRS-INSU, Sorbonne Universités, IDDRI)

Contrasting futures for ocean and society from different anthropogenic CO_2 emissions scenarios

J.-P. Gattuso,[1,2,3*] A. Magnan,[3] R. Billé,[4] W. W. L. Cheung,[5] E. L. Howes,[6] F. Joos,[7] D. Allemand,[8,9] L. Bopp,[10] S. R. Cooley,[11] C. M. Eakin,[12] O. Hoegh-Guldberg,[13] R. P. Kelly,[14] H.-O. Pörtner,[6] A. D. Rogers,[15] J. M. Baxter,[16] D. Laffoley,[17] D. Osborn,[18] A. Rankovic,[3,19] J. Rochette,[3] U. R. Sumaila,[20] S. Treyer,[3] C. Turley[21]

The Oceans 2015 Initiative

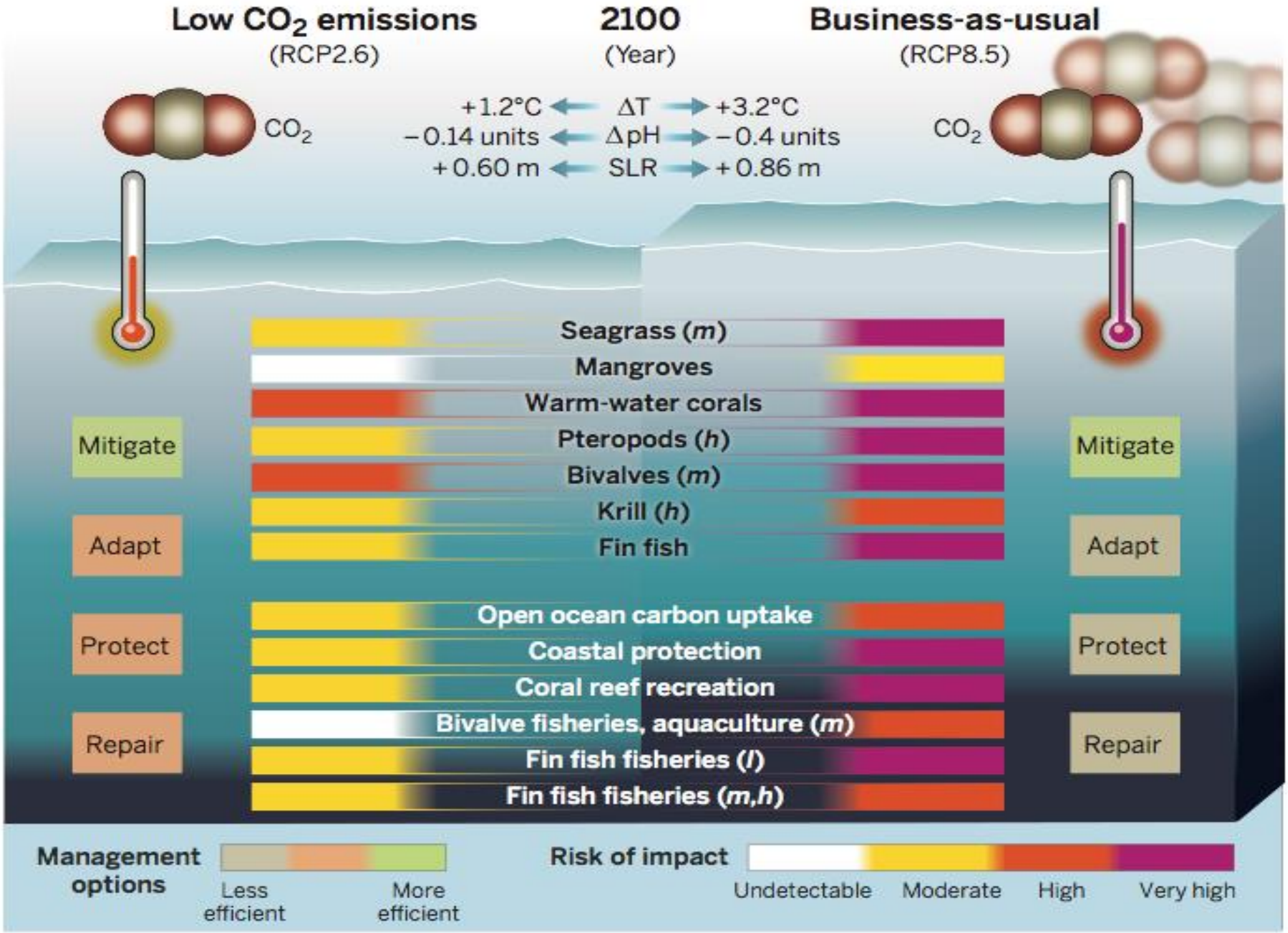
Objective

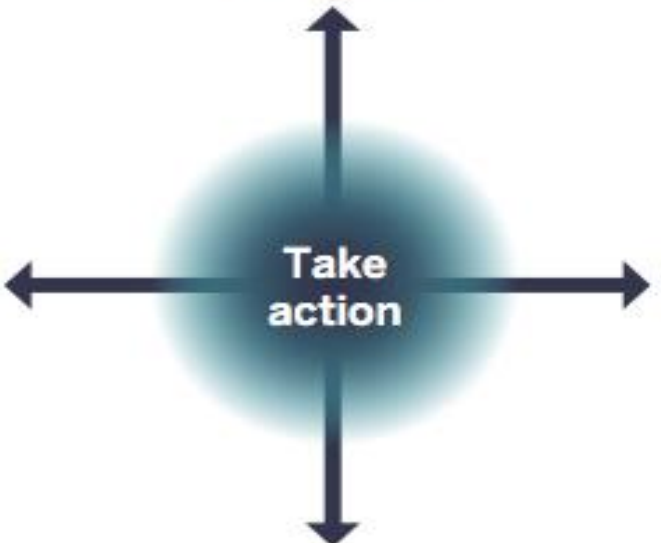
Provide COP21 negotiators and stakeholders with key information on what the future holds for the oceans depending on international negotiations outcomes

What we did

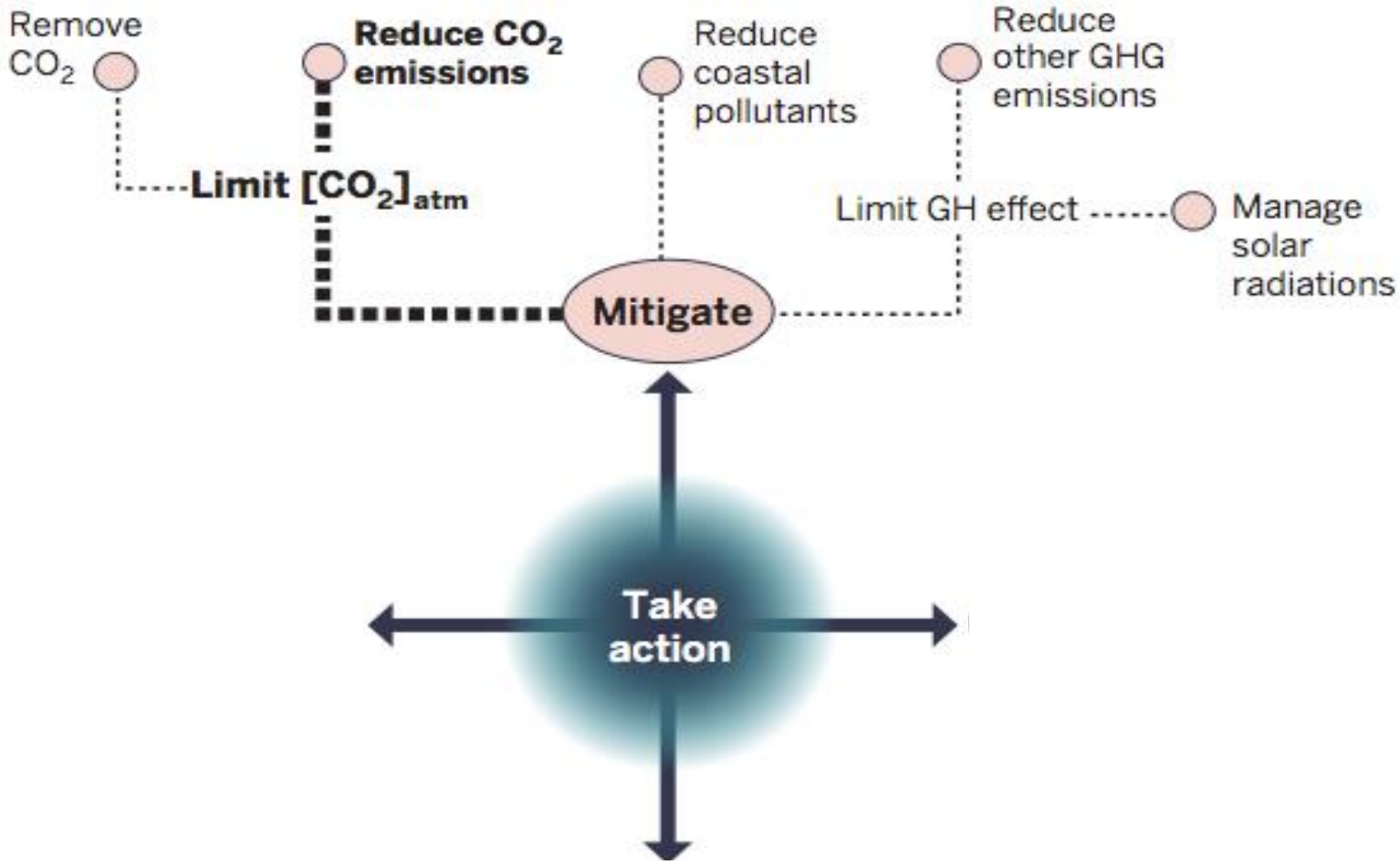
- Updated IPCC AR5 based on the last 2-3 years of publications
- Brought together a small group of scientists and experts to synthesize the best available science
- Compared the impacts on oceans and societies of the business-as-usual scenario (RCP 8.5, leading to +4° C by 2100) and a more ambitious scenario (RCP 2.6, leading to +2° C by 2100)

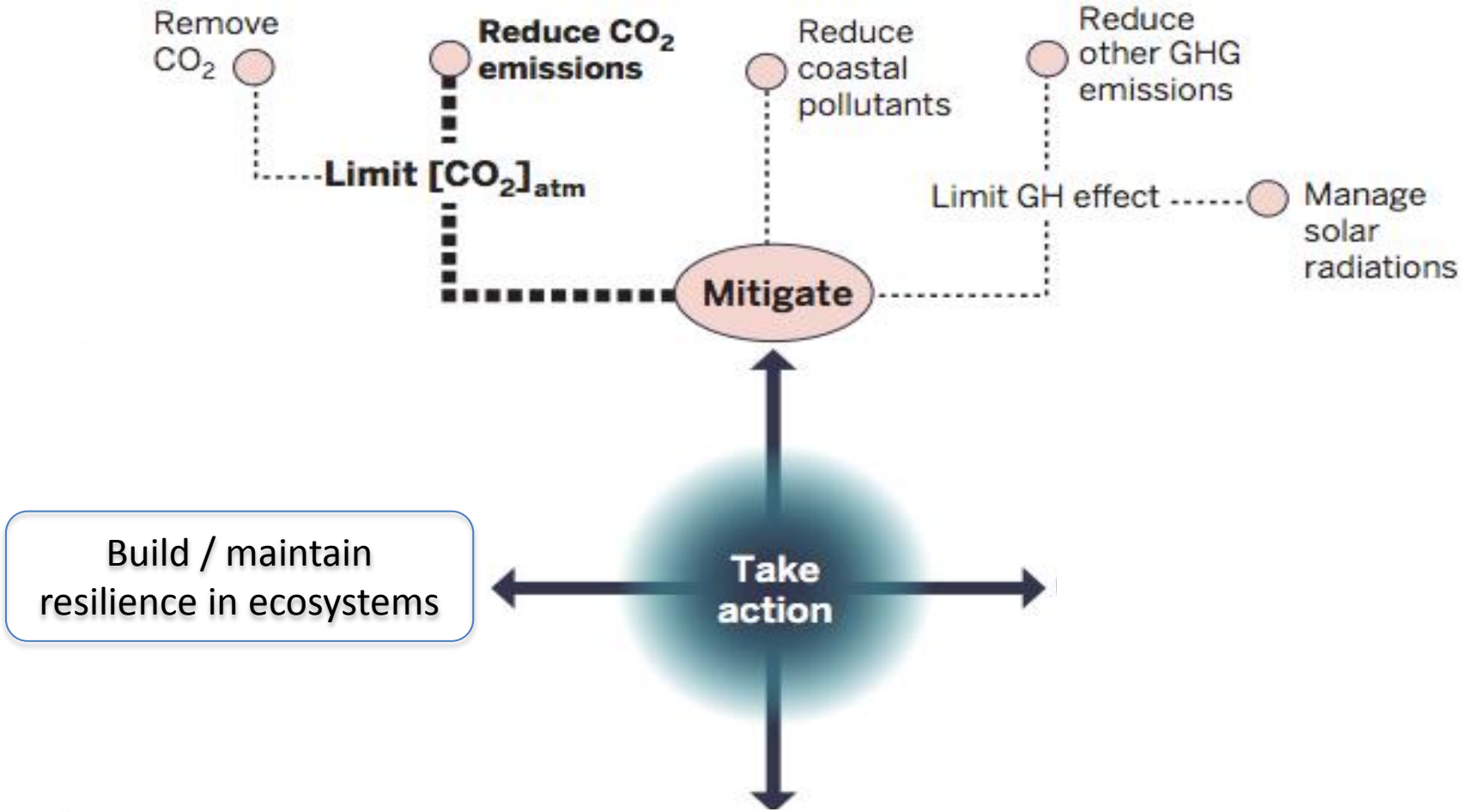
What we found

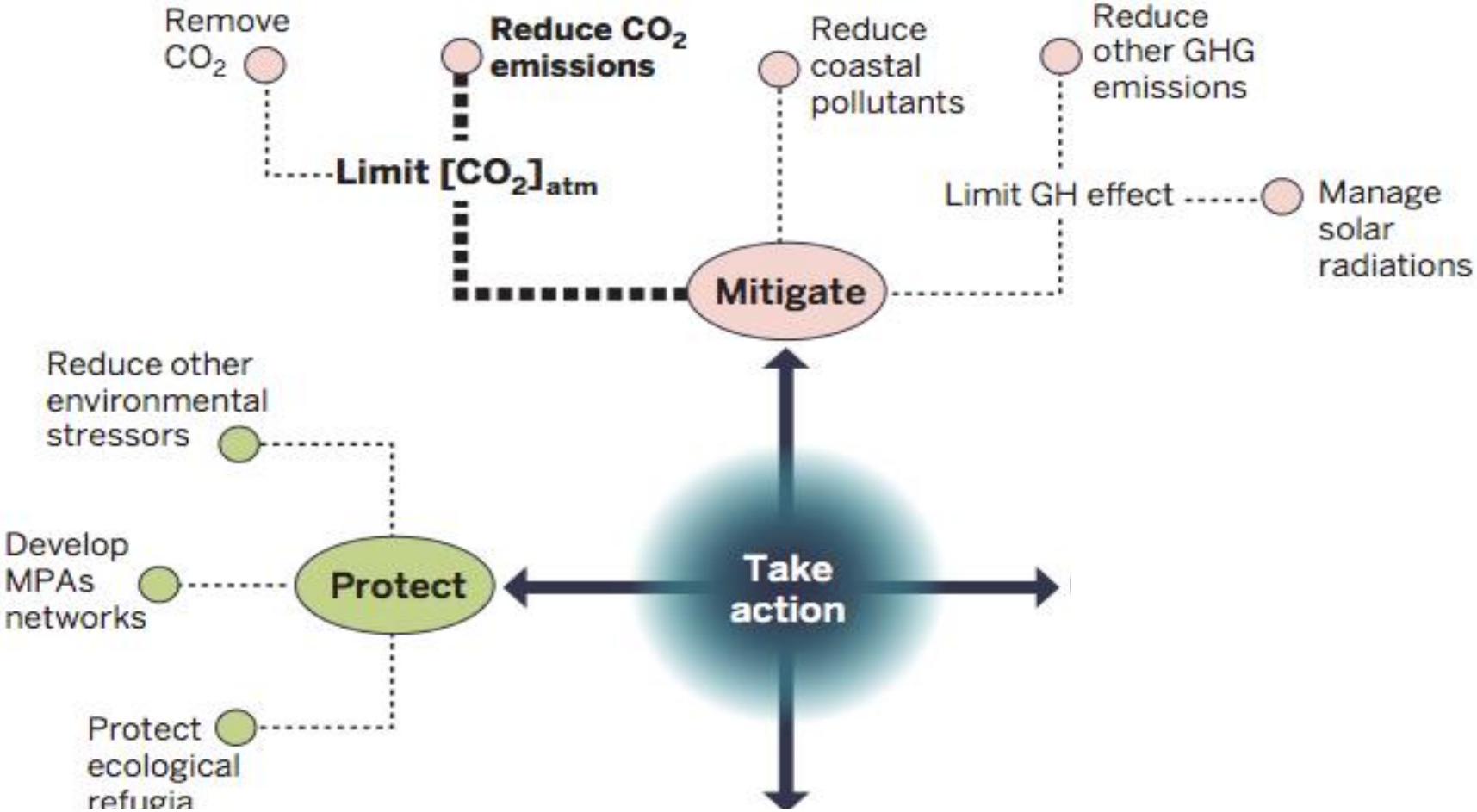

Low CO_2 emissions
(RCP2.6)
2100
(Year)
Business-as-usual
(RCP8.5)
CO_2
CO_2
+1.2°C ← ΔT → +3.2°C
−0.14 units ← ΔpH → −0.4 units
+0.60 m ← SLR → +0.86 m
Seagrass (m)
Mangroves
Warm-water corals
Pteropods (h)
Bivalves (m)
Krill (h)
Fin fish
Open ocean carbon uptake
Coastal protection
Coral reef recreation
Bivalve fisheries, aquaculture (m)
Fin fish fisheries (l)
Fin fish fisheries (m,h)
Mitigate
Adapt
Protect
Repair
Mitigate
Adapt
Protect
Repair
Management options
Less efficient
More efficient
Risk of impact
Undetectable
Moderate
High
Very high

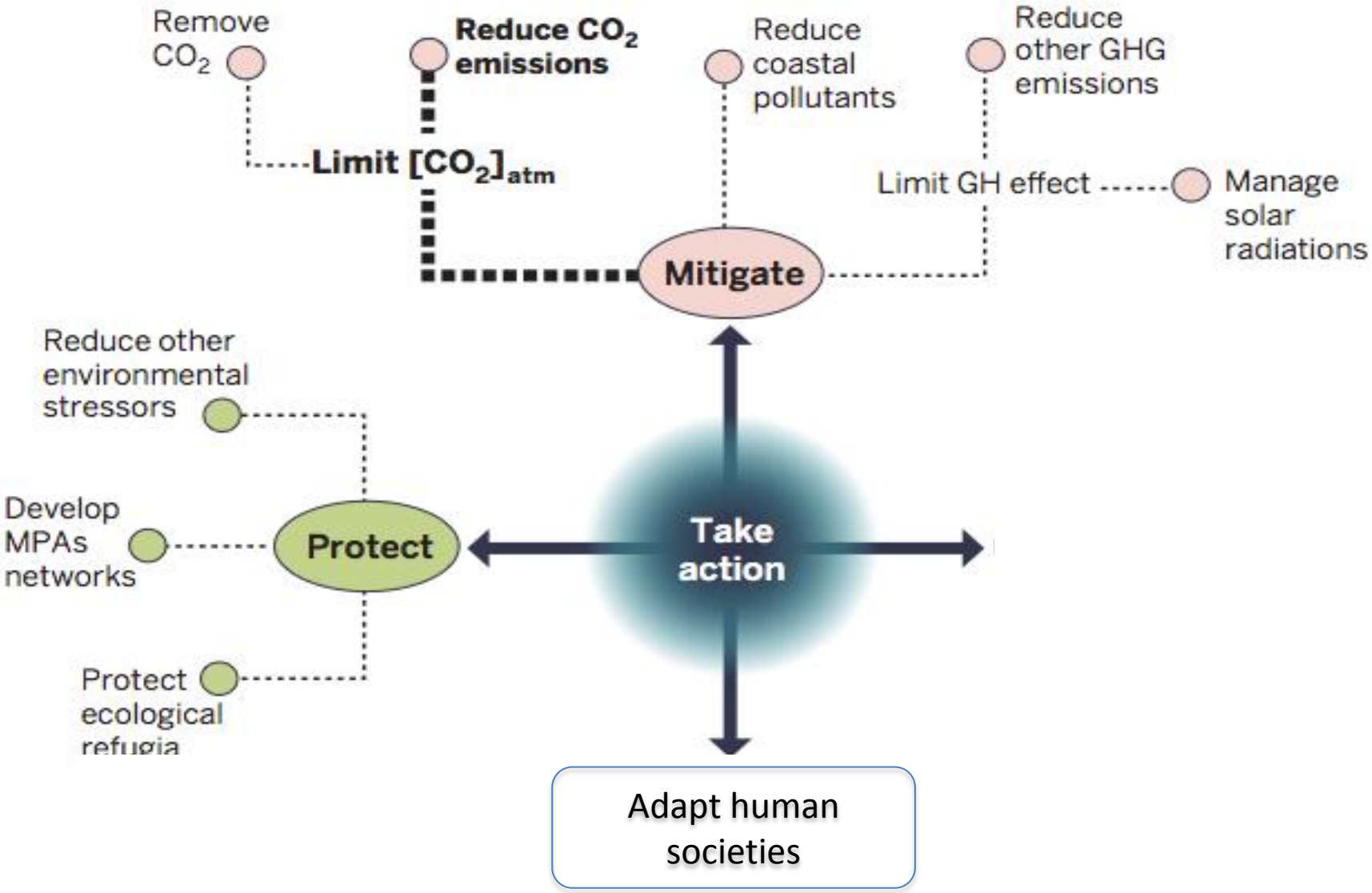

Take
action

Reduce drivers of
CC and OA


Remove CO_2
Reduce CO_2 emissions
Reduce coastal pollutants
Reduce other GHG emissions
Limit $[CO_2]_{atm}$
Limit GH effect
Manage solar radiations
Mitigate
Take action


Remove CO_2
Reduce CO_2 emissions
Reduce coastal pollutants
Reduce other GHG emissions
Limit $[CO_2]_{atm}$
Limit GH effect
Manage solar radiations
Mitigate
Take action
Build / maintain resilience in ecosystems


Remove CO_2
Reduce CO_2 emissions
Reduce coastal pollutants
Reduce other GHG emissions
Limit $[CO_2]_{atm}$
Limit GH effect
Manage solar radiations
Mitigate
Reduce other environmental stressors
Develop MPAs networks
Protect
Take action
Protect ecological refugia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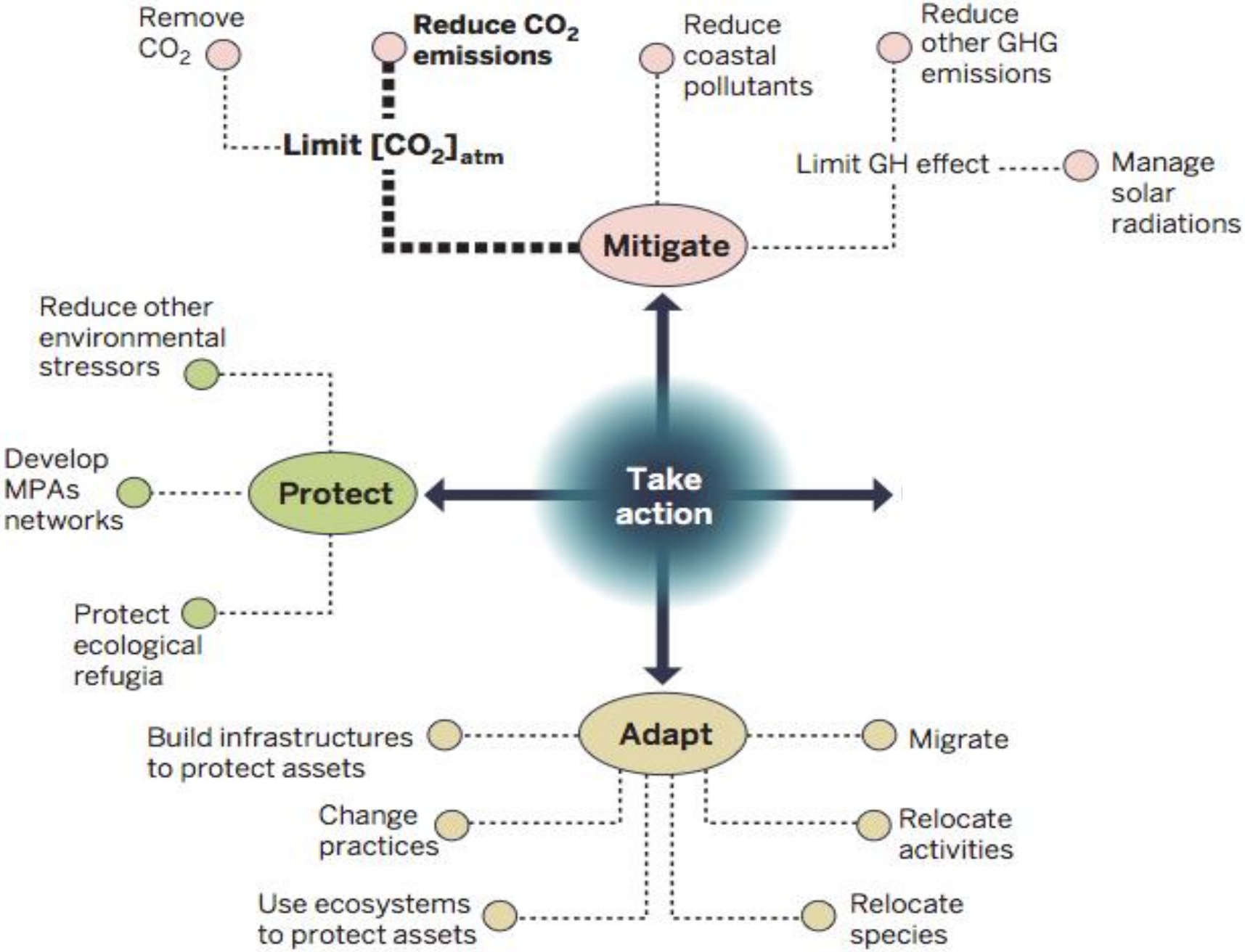
Limit GH effect
Manage solar radiations
Mitigate
Reduce other environmental stressors
Develop MPAs networks
Protect
Take action
Protect ecological refugia
Adapt human societies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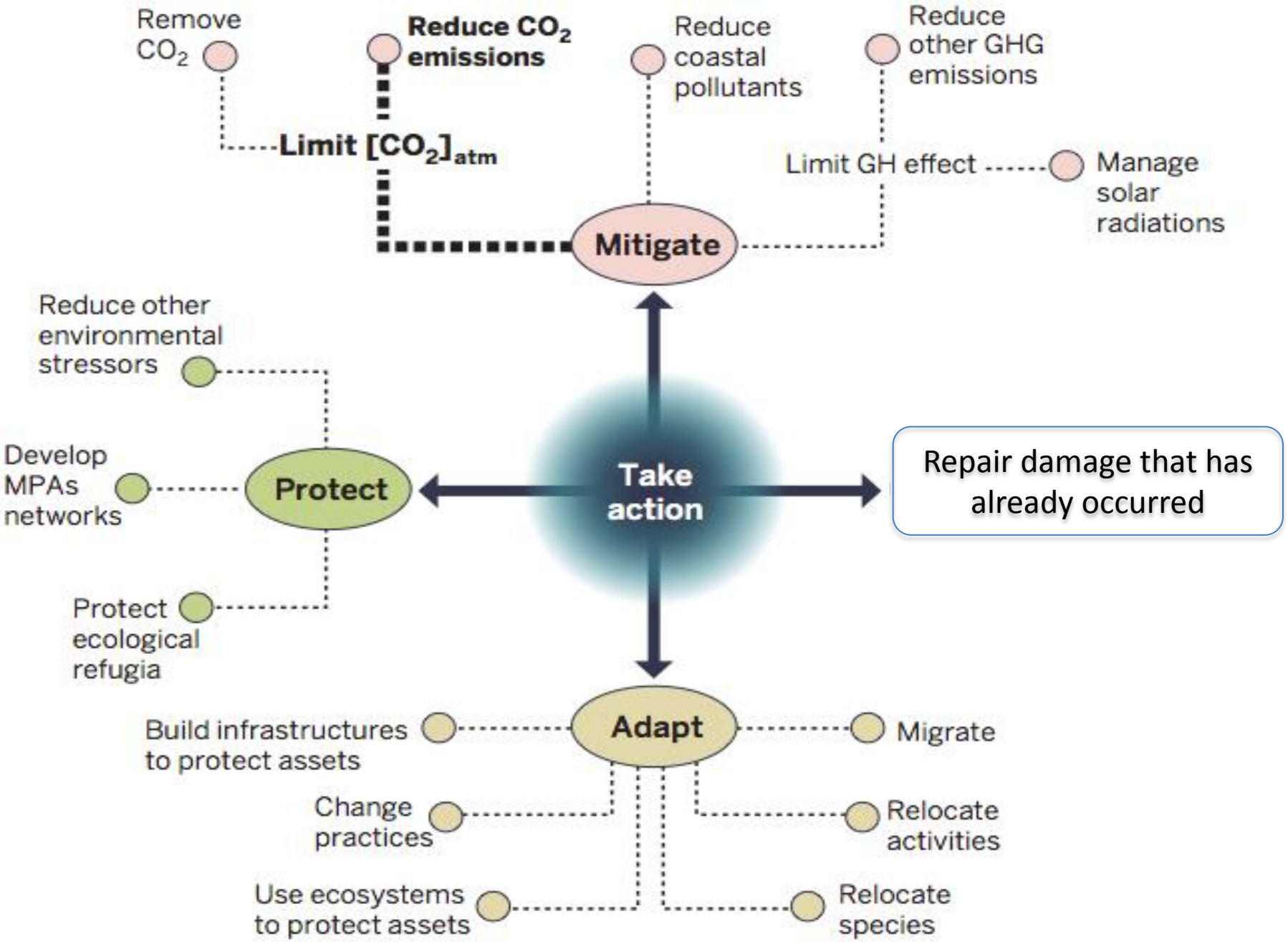
Limit GH effect
Manage solar radiations
Mitigate
Reduce other environmental stressors
Develop MPAs networks
Protect
Take action
Protect ecological refugia
Build infrastructures to protect assets
Adapt
Migrate
Change practices
Relocate activities
Use ecosystems to protect assets
Relocate species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Manage solar radiations
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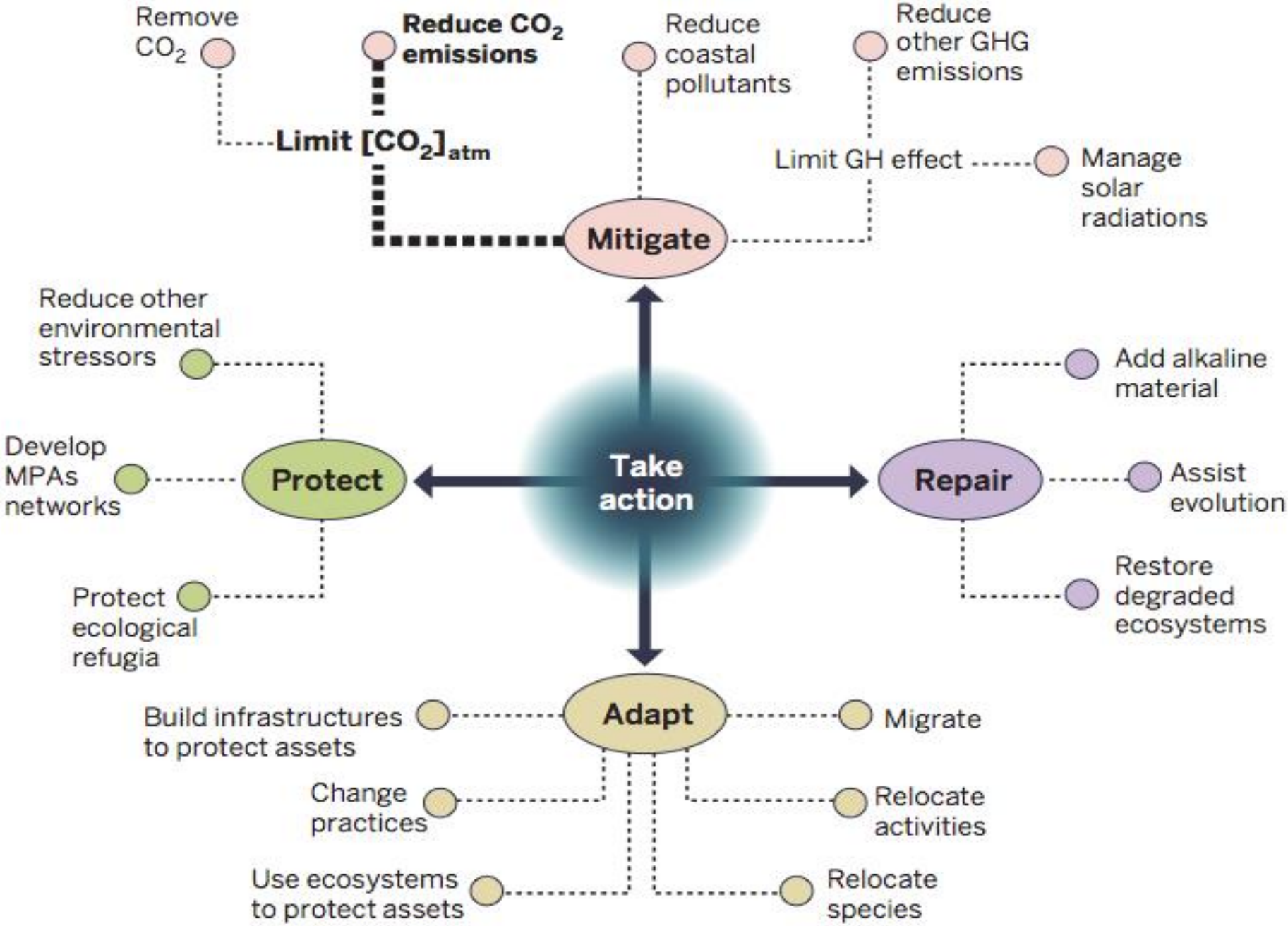
Protect
Take action
Repair damage that has already occurred
Protect ecological refugia
Build infrastructures to protect assets
Adapt
Migrate
Change practices
Relocate activities
Use ecosystems to protect assets
Relocate species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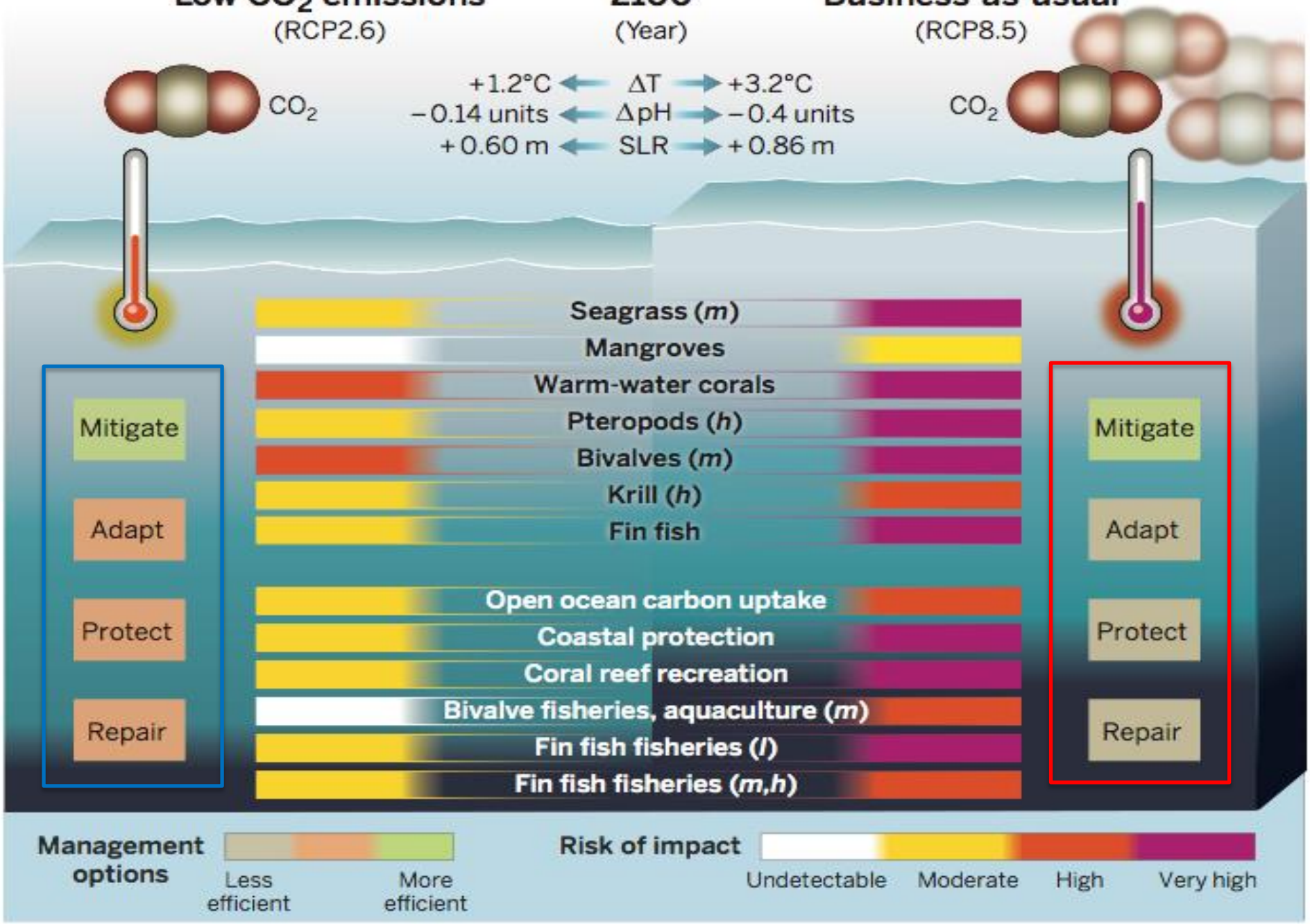
Reduce coastal pollutants
Reduce other GHG emissions
Limit $[CO_2]_{atm}$
Limit GH effect
Manage solar radiations
Mitigate
Reduce other environmental stressors
Develop MPAs networks
Protect
Protect ecological refugia
Take action
Add alkaline material
Repair
Assist evolution
Restore degraded ecosystems
Adapt
Build infrastructures to protect assets
Migrate
Change practices
Relocate activities
Use ecosystems to protect assets
Relocate species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Key messages

There are plenty of things we can do

But the worse the problem gets, the more our range of options dwindles

Not a whole new programme of actions:

- Some are specific (research and monitoring, repair, CO2 removal, aquaculture adaptation…)
- Some need refinement (coastal pollutants reduction, MPAs and ecological refugia…)
- Most bring major co-benefits
- Good and bad news

Need to feed back into climate change negotiations

What is expected from COP21?

1. Framework agreement
2. INDCs
3. Financial pillar
4. Solutions agenda

How are we relevant?

- What can be done in practice?
- Under which conditions?
- At what cost?

Thank you

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