



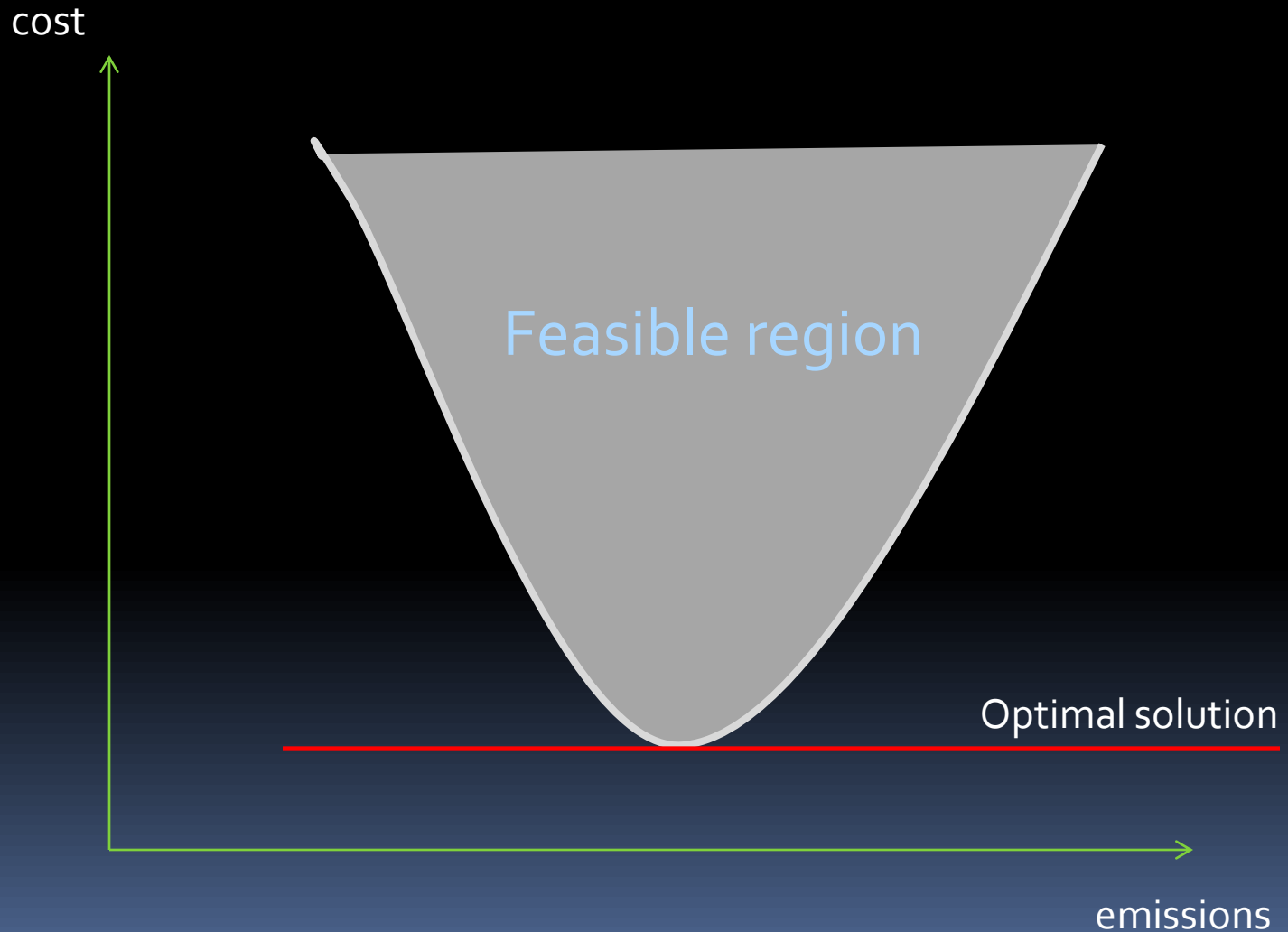
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MULTI-OBJECTIVE OPTIMIZATION

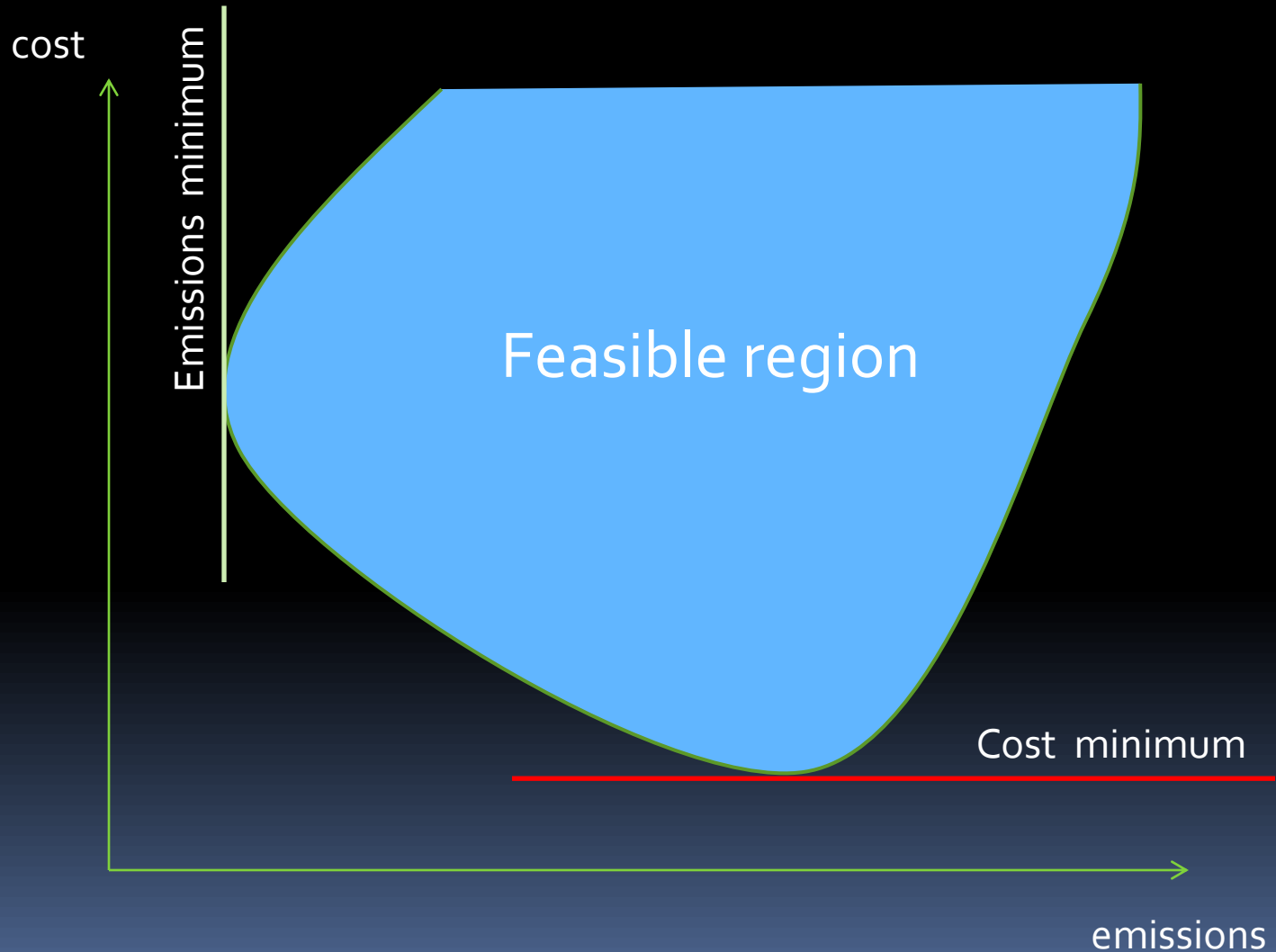
Definition

- Simultaneous optimization of different goals
 - May have:
 - Different units
 - Different directions
 - Different agents
- Simple version: weighted optimization
 - Transform all goals into a comparable unit
 - E.g.: costs on emissions

Single-objective Optimization




Multi-objective Optimization

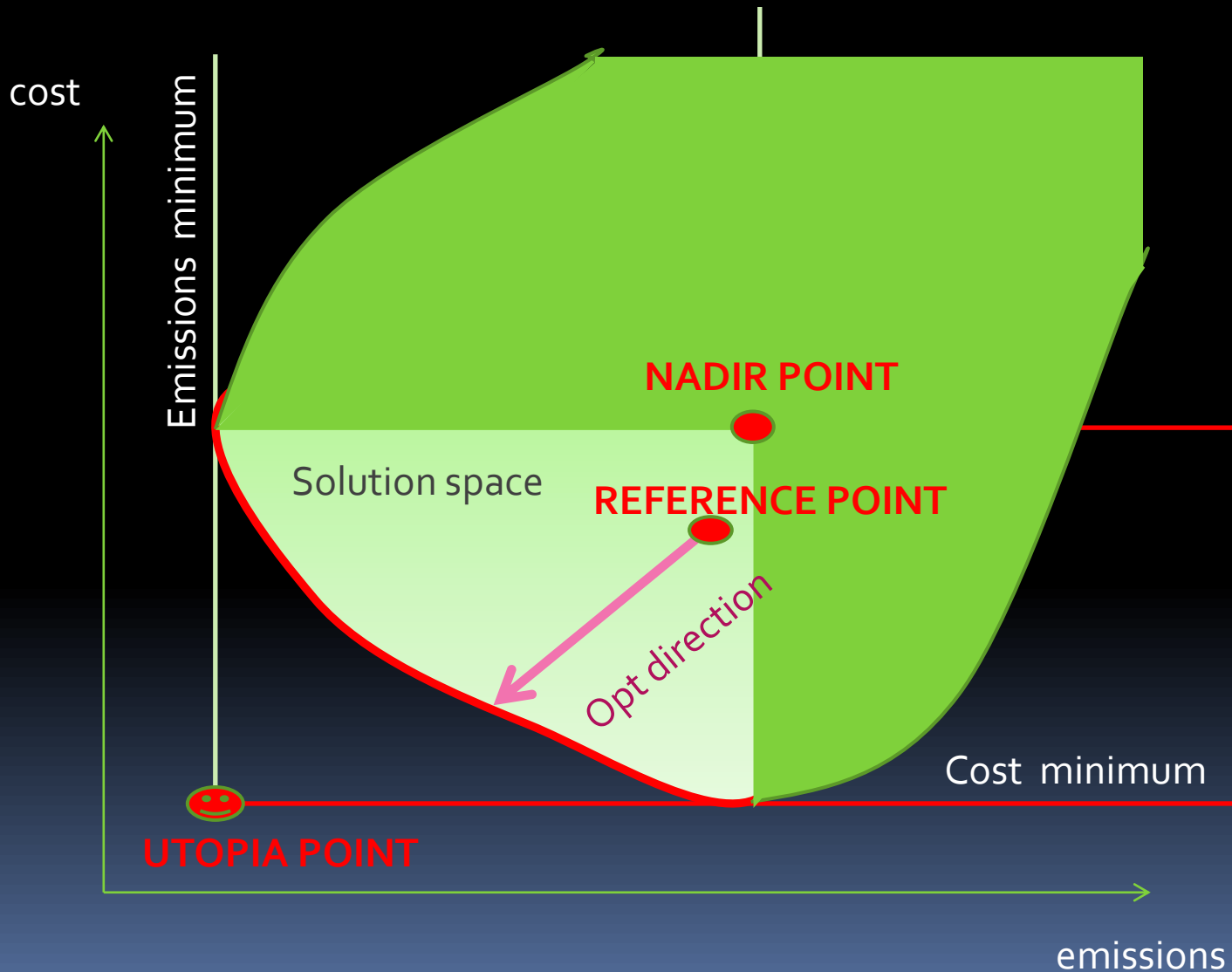




Benefits

- Improved model formulation
 - Model consistency improvement by optimizing in different directions
 - Better control if different goals depend correctly on each other
 - Better model understanding
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Multi-objective Optimization



Formulation

- *Objective:*

- $\max \left(\min_{1 < i < n} \left(\frac{(f_i(x) - \omega_i)}{(z_i - \omega_i)} + \rho \sum_{i=1}^n \frac{(f_i(x) - \omega_i)}{(z_i - \omega_i)} \right) \right)$

f_i	Single objectives
ω_i	Reference point
z_i	Utopia point



Possible objectives

- Cost minimization
 - GHG minimization
 - Renewables maximization
 - Import diversification
 - Profit maximization
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