Sustainable Development

Outcome approach:

— How the economic process directly affects human well-being

— Sustainability is defined as the utility of a representative agent in any period t, $U(t)$ to be non-declining for the rest of the time from t^* onwards.

i.e.
$$\frac{dU(t)}{dt} \geq 0 \quad \text{for all } t > t^* \longrightarrow (1)$$

or, that in any period t, the utility of that representative agent does not exceed the max. sustainable level of utility, depending on the economy's potential at time t.

i.e.
$$U(t) \leq U_m(t) \longrightarrow (2)$$

where for time periods s following on from time periods t :

$$U_m(t) = \text{max } U \text{ given } U(s) \geq U(t) \text{ for all } s \geq t$$

Eqⁿ (2) → SD occurs when utility per capita is not falling over time

* Economic Indicators of Sustainability :

1. Green Net National Product :

→ Consider an economy with a representative agent who derives utility from consumption of both produced goods and environmental amenities, given by a vector C_t, $t →$ time

→ Production is determined by aggregate capital stock, a vector k and technological progress which depends on time (passage of time)

→ An economy is deemed to be sustainable at time t if utility is less than or equal to maximum sustainable utility at this time

→ 'Sustainable' → consistent with non-declining values of $U(c)$

The economy maximises the PV of utility over infinite time, at a const. discount rate ρ :

$$\underset{c, \dot{k}}{Max} \int_0^\infty U(C_t) e^{-\rho t} dt \longrightarrow (1)$$

Studies have shown that for this economy to be sustainable, Green NNP (GNNP) Y^t, defined as

$$Y^t = P(t) \cdot c(t) + V(t) \dot{k}(t) \longrightarrow (2)$$

must be non-declining at time t.
That is,

$$\dot{Y}(t) \leq 0 \Rightarrow U(t) > U_m(t) \longrightarrow (3)$$

i.e. if GNNP is declining at time 't', then utility must exceed the max^m sustainable level.

$P =$ rel. price for consumption goods & env. amenities

$V =$ price for each element for cap-stock

$\dot{k} =$ rate of change in k

2. Genuine Savings:

$$GS = V \cdot \dot{K} \neq \dot{K} + \dot{K}^A + \left(P^R - f_R \right) \cdot \dot{S} \quad \longrightarrow (4)$$

The Test of unsustainable development is then whether GS is negative or not. That is

$$GS(t) < 0 \Rightarrow U_t > U_m(t) \longrightarrow (5)$$