

Economic Bases of Atoms for Peace

« *from sustainable development to responsible evolvement: the role of nuclear* »

22 October 2013 Assisi

from

SUSTAINABLE DEVELOPMENT

↓
to

**RESPONSIBLE
EVOLVEMENT**

The role of nuclear power

Economic Bases of Atoms for Peace

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DEFINITION OF « *ECONOMICS* »

“ECONOMICS IS THE STUDY OF HOW SOCIETY CHOOSES TO ALLOCATE ITS **SCARCE** RESOURCES TO THE PRODUCTION OF GOODS AND SERVICES IN ORDER TO SATISFY **UNLIMITED** WANTS.”

SCARCITY

**THIS CONCEPT OF *SCARCITY* IS ESSENTIAL
TO THE FIELD OF
ALL CONVENTIONAL ECONOMICS
THEORIES WHICH DRIVE THE WORLD,
WHETHER INSPIRED
BY KEYNESIAN, NEO-CLASSIC, LIBERAL,
MARXIST, etc...**

WE *WOULD BE* LIVING IN A CLOSED AND FINITE WORLD



SCARCITY = COMPETITION

**THE PERCEPTION OF SCARCITY RISE TO
COMPETITION FOR RESOURCES.**

**THUSLY, HIERARCHIES OF ACCESS TO
RESOURCES WERE BORN,
WITH THE VERY FAMILIAR DRAWING OF
THE SOCIAL PYRAMID**

☞ WINNERS AT THE TOP

☞ LOSERS AT THE BOTTOM

SCARCITY « GAME »

**SOCIETAL MALFUNCTIONING IS THERE,
WITH ALL NECESSARY BASES FOR
CONFLICTS.**

**AGRESSION, OPPRESSION, CONFLICTS,
FIGHT FOR POWER,**

ARE THE "WINNING" STRATEGIES

WHICH ARE FITTING WITH

THE SCARCITY GAME

TO AVOID SOCIAL INEFFICIENCY

**“WE” HAVE TO ENSURE
THE WORLD WIDE RESOURCES
PROPER UTILIZATION
TO AVOID A SO-CALLED
*ECONOMICAL AND SOCIAL INEFFICIENCY***

RESOURCES ALLOCATION

AND, COMES THE NOTION OF
«**ALLOCATING SCARCE RESOURCES**»
... EMBODIES IN THE SO MANY THEORIES
OF PRODUCTION, DISTRIBUTION,
CONSUMPTION,
BUSINESS FLUCTUATIONS, AND OTHER
ECONOMIC ELEMENTS.

THE MARKET DICTATORSHIP

**THE COLLAPSE OF
COMMUNIST ECONOMICS
GIVE UNLIMITED CREDIBILITY
TO LIBERAL ECONOMICS
WHICH IS NOW WORLDWIDE AGREED AS
THE BEST (*THE ONLY ?*) WAY**

THE MARKET MIRACLE

**THE MARKET APPEARS AS
THE EFFICIENT TOOL FOR
ALLOCATING SCARCE RESOURCES,
MAKING POSSIBLE TO PRODUCE FOR
WHOSE CAN AFFORD
THE PRICE OF GOODS AND SERVICES.**



MANAGING SCARCITY

SCARCITY WOULD BE MANAGED BY MAKING CHOICES REGARDING VALUE SO THAT INDIVIDUALS CAN EXCHANGE RESOURCES IN A SYSTEM OF TRADE.

IN IDEAL CIRCUMSTANCES, PRICING SYSTEMS ADJUST ACCORDINGLY, THEREBY MAINTAINING THE BALANCE OF SUPPLY AND DEMAND.

THE MARKET LAWS : BUT (1)!

ON THE FIRST:

**THE MARKET LAWS :
SHORT TERM \neq LONG TERM**

**SHORT TERM SPECULATIVE DECISIONS
CAN & MUST NOT DRIVE LONG TERM
INVESTMENTS POLICY**

THE MARKET LAWS : BUT (2)!

ON THE SECOND :

MARGINAL UNIT *VALUE* MOVES TO ZERO

**WHAT IS THE *VALUE* OF THE VERY LAST
FRESH WATER CUBIC METER?**

ANSWER : ∞

THE « *INVISIBLE HAND* » OF ADAM SMITH

**- *THE MARKET LAWS* -
WILL NEVER SOLVE SPONTANEOUSLY
ECONOMICAL MALFUNCTIONMENT**



THE FATALITY

**AS ANY *CLOSED* SYSTEM,
ECONOMIC SYSTEM HAS TO FOLLOW
THERMODYNAMICS LAWS.**

***“THE ENTROPY OF A CLOSED SYSTEM
INCREASES INDEFINITELY UNTIL IT
COLLAPSES”***



**IT WOULD BE IMPOSSIBLE TO AVOID
THE FINAL CATASTROPHE DUE TO
INCREASED POLLUTION AND
EXPLODING DEMOGRAPHY,
FACING THE RECKLESS EXPLOITATION OF
NATURAL RESOURCES LEAD TO THEIR
DEPLETION FOLLOWING THE RICARDO
LAW OF DIMINISHING RETURNS
IN AN *ENTROPIC* PROCESS**

BERGSON :

“THIS IMAGE OF THE INEXORABLE DEATH OF THE UNIVERSE SUGGESTED BY THE SECOND PRINCIPLE ... THIS IDEA THAT, BECAUSE OF THE VERY NATURE OF THINGS, THE ONLY POSSIBLE AND ULTIMATE FUTURE FOR MAN IS THE ANNIHILATION OF THINGS, HAS INFILTRATED LIKE PARALYSIS THROUGH OUR ENTIRE CULTURE”

THE POLITICALLY CORRECT SOLUTION

**WE COULD ONLY *RETARD*
THE *FINAL GÖTTERDÄMMERUNG*
BY SLOWING DOWN
THIS ENTROPIC SYSTEM**

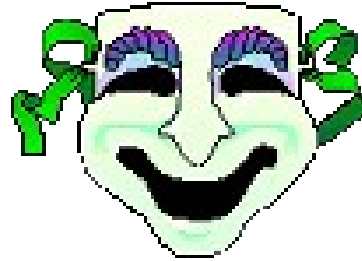
TO SLOWDOWN

**AND COMES,
THE NOTION OF «RATIONING »,
OR, BETTER,
TO «ALLOCATE »
SCARCE RESOURCES**

SUSTAINABLE DEVELOPEMENT

IN FACT, THIS IS THE LAST AVATAR OF A ***MALTHUSIAN STRATEGY*** WHICH SOMBRELY PROCLAIMS THAT THE EARTH WILL NO LONGER BE ABLE TO GUARANTEE A STANDARD OF LIVING, COMPARABLE TO THE STANDARD OF LIVING OF THE AVERAGE AMERICAN TODAY, FOR ALL THE INHABITANTS OF THE PLANET

**IS IT POSSIBLE TO AGREE SUCH
PESSIMISTIC VIEW
ABOUT THE FUTURE OF HUMANITY ?**



THE CONVENTIONAL ECONOMIC THEORIES

ARE BASED ON SEVERAL DOGMAS, SUCH « REVEALED TRUTHS », WHICH ARE EMBODIED IN THE GENERAL CONCEPT OF SCARCITY



SOME ECONOMIC DOGMAS (1)

○ THE ECONOMIC FUNCTION

$$Y(t) = f(K, L) + \text{residue}$$

○ THE REVERSIBILITY OF ECONOMIC PROCESSES

○ LABOUR AS A PRODUCTION FACTOR

○ TIME AS A MEASURE OF TECHNICAL PROGRESS



SOME ECONOMIC DOGMAS (2)

- THE ADDITIVELY OF THE PRODUCTION FUNCTION**
- THE EXISTENCE OF A CONSERVATIVE, CLOSED ECONOMIC SYSTEM, WHOSE LIMITED RESOURCES ARE REGULATED BY DETERMINISTIC PROCESSES**
- THE MYTHICAL EXISTENCE OF A GENERAL EQUILIBRIUM...**



ALL THESE DOGMAS ARE THE FOUNDED
CORE FOR A **CLOSED** SYSTEM OF
LIMITED RESOURCES RUNS BY
REVERSIBLE PROCESSES BASED
ON THE USE OF AN **HAMILTONIAN**
MOVING “NATURALLY” TO THE FINAL
CATASTROPHE. SOME PARTIAL LOCAL
INSTABILITITES COULD BE EXPLAINED BY
NON-LINEAR FUNCTIONS



REVERSIBILITY ?

**ARE THE ECONOMIC SYSTEM MOVED BY
REVERSIBILITY ?**

IS $Y(-t) = -Y(t)$?

NO !

**ECONOMIC SYSTEM HAS TO FOLLOW
*PRIGOGINE NON-REVERSIBLE
THERMODYNAMICS***

LABOUR ? ECONOMIC FUNCTION ?

IS LABOUR A PRODUCTION FACTOR ?

NO !

LABOR IS DUAL : *OPUS* & *LABOR*

ΕΡΓΟΣ & ΠΟΝΕΣ

LABOR* ≡ *ENERGY* + *KNOWLEDGE

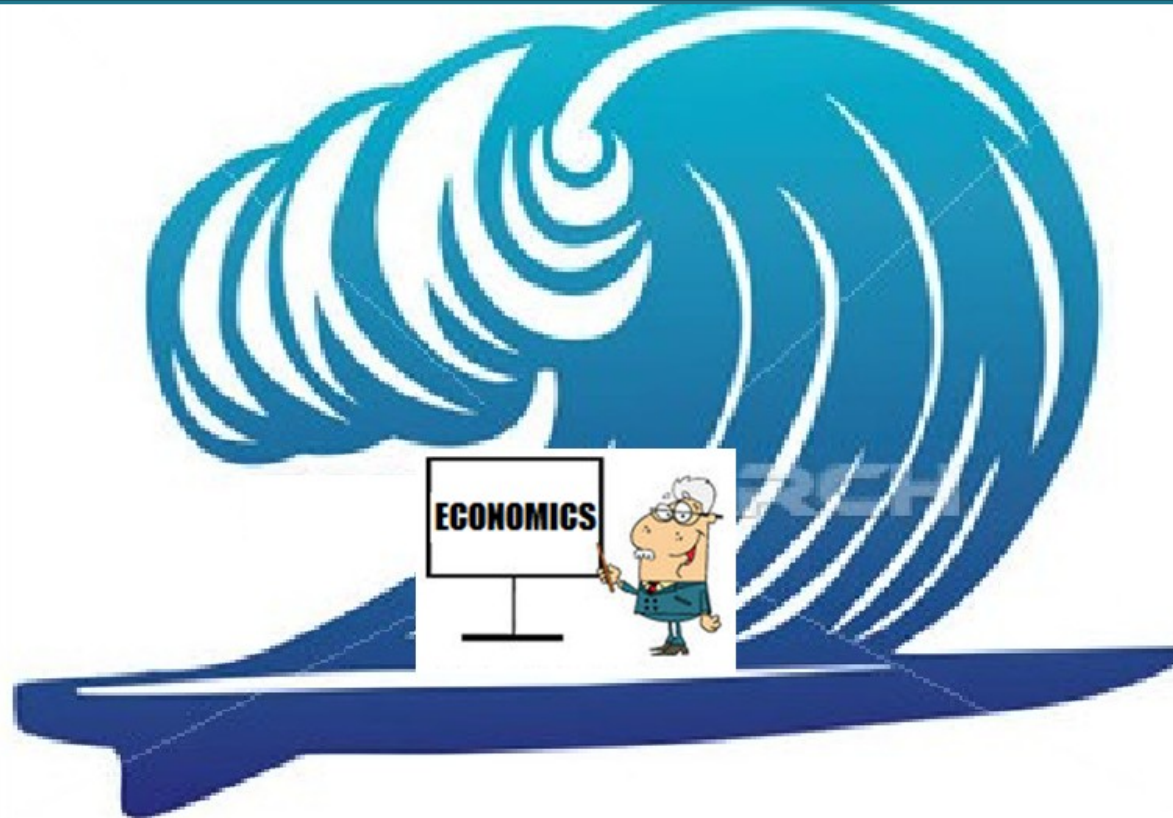


$$Y = f[K, M, U, E]$$

PROPERTIES OF KNOWLEDGE

- **KNOWLEDGE IS UNIQUE**
- **IT HAS NO ADDITIVELY PROPERTIES**
- **IT IS USED WITHOUT CONSUMPTION**
- **IT USE INCREASES ITS VALUE**
- **IT HAS A COST, BUT NO FORECASTED VALUE**
- **SAME KNOWLEDGE MAY BE SHARED BY MANY**

KNOWLEDGE IS NEGENTROPIC



**NO ADDITIVITY, NO HAMILTONIAN, NO LONG TERM
GENERAL EQUILIBRIUM BUT POSSIBLE SHORT TERM LOCAL
EQUILIBRIUM, CHAOTIC REGIME, etc...**

A SECOND APPROACH TO THE CONCEPT OF EVOLUTION HAS DEVELOPED IN LINE WITH A VIEW OPPOSED TO THE CARNOT/CLAUSIUS PRINCIPLE.

IN BIOLOGY, AS IN SOCIOLOGY, THE CONCEPT OF EVOLUTION APPEARS TO BE CLOSELY ASSOCIATED WITH A PROCESS OF ORGANIZATION WHICH CAN LEAD TO THE CREATION OF INCREASINGLY COMPLEX STRUCTURES.

PRIGOGINE :

**THE EVOLUTION OF ANY SYSTEM
DEPENDS ON WHETHER THE VALUE OF
 ΔS (*ENTROPY*) IS NEGATIVE OR POSITIVE:**

$$\Delta S = \Delta S_i + \Delta S_e < / > 0$$

THERE IS DEVELOPMENT

IF AND ONLY IF :

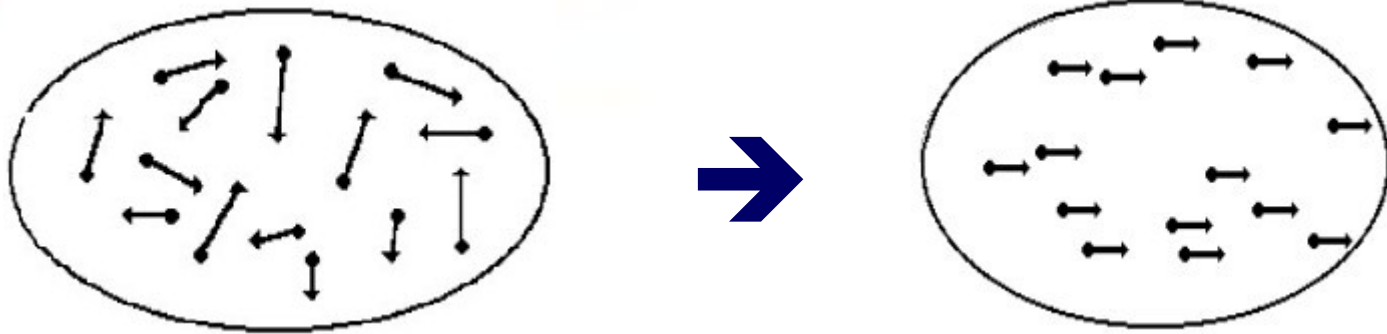
$$|\Delta S_e| > \Delta S_i$$

THE ENTROPY OF A *CLOSED* SYSTEM IS POSITIVE ... WHICH MOVES IT TO THE FINAL CATASTROPHE.

IN ANY *OPEN* SYSTEM *NEGENTROPIC* FLOWS COULD REVERSE FROM THE FATAL DISASTER.

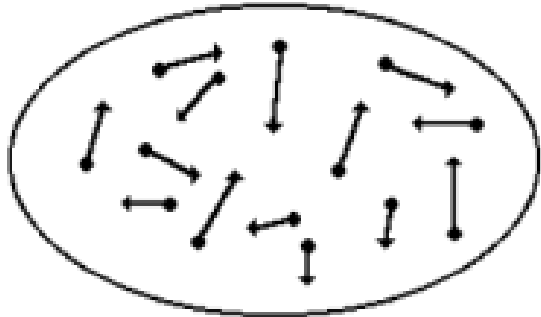
$\Delta S_e < 0$ (NEGENTROPY)

FROM A «CLOSED» SYSTEM TO AN «OPEN» SYSTEM (PRIGOGINE)



IS IT POSSIBLE FOR AN ECONOMIC-SOCIAL SYSTEM TO MOVE FROM « A » TO « B » (*SHANNON PERFECT STATE*) IN BY-PASSING CLAUSIUS'S THERMODYNAMIC FATALITY?

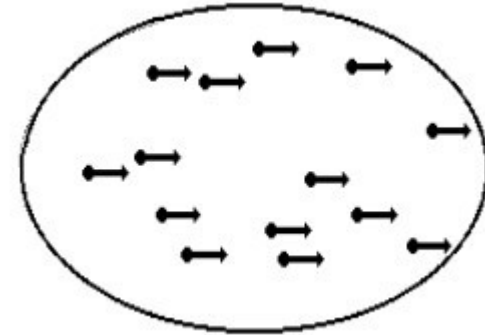
WHAT IS ENTROPY ?



$$E = W + Q$$

$$\Delta S \nearrow$$

$$\text{ORDER} = n$$



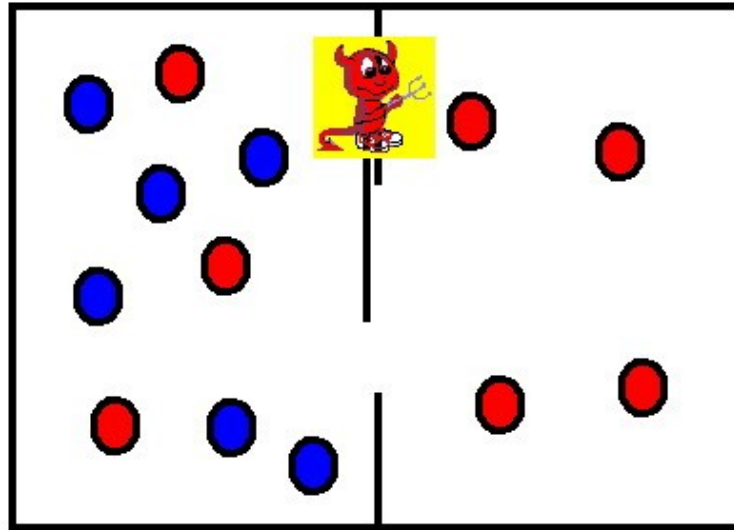
$$E = W$$

$$\Delta S = 0$$

$$\text{ORDER} = 1$$

The total loss of efficiency is a measure of the increase in entropy. (de Rosnay)

MAXWELL ENIGMA (1)



**THE « MAXWELL » DEVIL MAY INCREASE
ORDER ENTROPY (CLAUSIUS DEFINITION)
WITHOUT WORK**

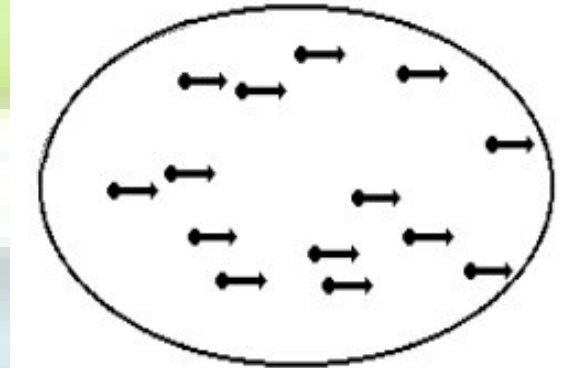
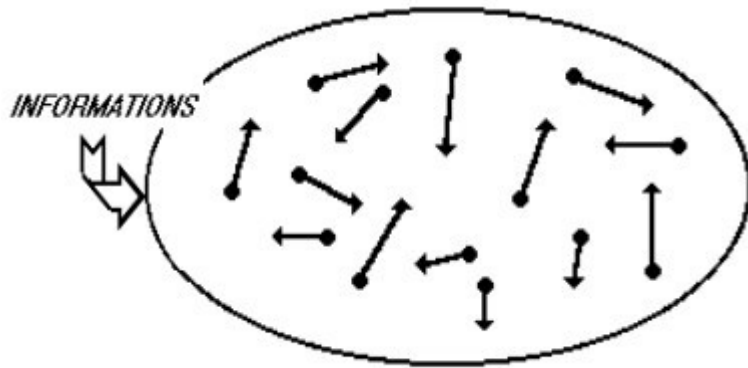
MAXWELL ENIGMA (2)

**EVEN THE GREAT RESPECT
WE HAVE FOR MAXWELL,
HE FORGOT SOMETHING:**

**HIS DEVIL MUST *KNOW* THE COLOR OF
THE BALL !!!**

⇒ *KNOWLEDGE !*

FROM A «CLOSED» SYSTEM TO AN «OPEN» SYSTEM



$$\log E = \beta \sum_i g_i Q_i e^{-\beta Q_i}$$

$$\text{INFORMATION FLOWS} = \delta E / \delta t \Leftrightarrow \Delta S_e$$

CLAUSIUS' ENTROPY DEFINITION \equiv SHANNON' ENTROPY DEFINITION

THE REALITY

AN OPEN SYSTEM OF
UNLIMITED RESOURCES RUNS BY
IRREVERSIBLE PROCESSES BASED ON A
MULTINOMIAL FUNCTION WHICH
DESCRIBES A CHAOTIC REGIME WITH
POSSIBLE SHORT TERM LOCAL STABILITY.
PROPERLY MANAGE, IT COULD EVOLVE TO
INFINITE RELIABLE ABONDANCE.

DECLINE OR GROWTH ?

- FROM EXPLOITATION OF LIMITED NATURAL RESOURCES,
- TO THE USE OF THE UNLIMITED HUMAN SKILLS



DEVELOPMENT OR EVOLVEMENT ?

- **FROM DEVELOPMENT BASED ON ENTROPIC EXPLOITATION OF TANGIBLE**
- **TO EVOLVEMENT BASED ON NEGENTROPIC USE OF INTANGIBLE**

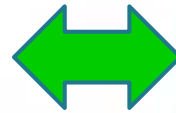


SCARCITY



**UNSUSTAINABLE
DEVELOPMENT**

ABUNDANCE



**SUSTAINABLE
PEACE**

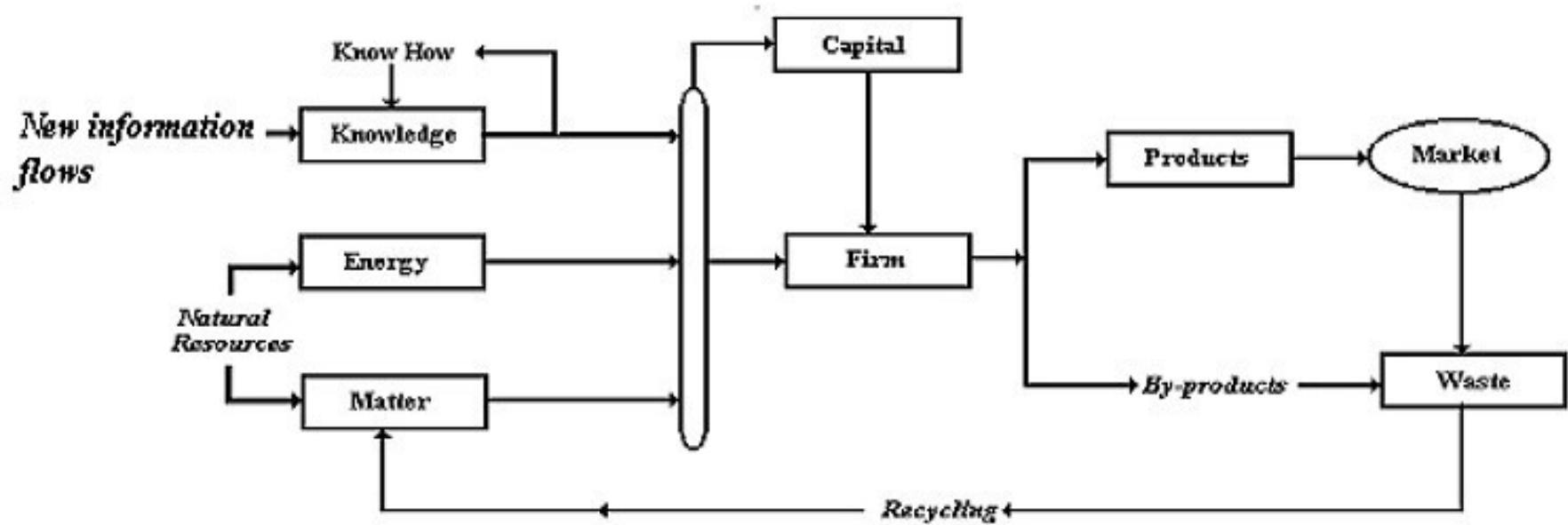


ROSTOW'S TREND ... TO A SUSTAINABLE CATASTROPHE

**HUMANITY MAY FOLLOW THE
POLITICALLY CORRECT ROSTOW'S TREND
OF A CLOSED SYSTEM ... FROM A CRISIS
TO AN OTHER CRISIS (*PERFECTLY DESIGN
BY K. MARX !*) ... TO THE FINAL
CATASTROPHE !**

***EITHER*, WE FOLLOW THE ABSURD AND DARK PATH MARKED OUT BY IGNORANCE, AND DECIDE TO DISCARD NUCLEAR ENERGY : POLLUTION WILL CONTINUE TO SPREAD ITS BLACK WINGS OVER THE ENTIRE PLANET. THE WEALTH OF NATURE WILL DIMINISH. THE POOR WILL BE EVEN POORER AND EVER MORE NUMEROUS. HUMANITY WILL GO FASTER TO THE FINAL *GÖTTERDÄMMERUNG* !**

**OR, WE CAN CHOOSE TO RESUME
ECONOMIC GROWTH, CREATING WEALTH,
JOBS, PRESERVING ENVIRONMENT, BASED
ON THE INCREASED USE OF NUCLEAR
ENERGY, WHICH WILL CREATE ALL
NECESSARY CONDITIONS FOR A RELIABLE
ABUNDANCE, THE PREREQUISITE FOR OF
PEACEFUL WORLD.**



LAVOISIER'S LAW :

- **NOTHING IS LOST, NOTHING IS CREATED, EVERYTHING IS TRANSFORMED**



DECLINE OR GROWTH ?

DUE TO NUCLEAR ENERGY

⇒ **WEALTH** ↗

⇒ **WASTE RECYCLING** ↗

⇒ **POLLUTION** ↘

⇒ **THE N°1 FRIEND:**

NUCLEAR ENERGY



**BY CREATING UNLIMITED WEALTH,
NUCLEAR ENERGY
IS THE WAY
FOR A RESPONSIBLE EVOLVEMENT**

MERCI DE VOTRE ATTENTION

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