

COMPLEXITY and Tradable Energy Quotas (TEQs)

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The Lean Economy Connection

COMPLEXITY AND SYSTEMS

1. **The Complex System**
2. **The Modular System**
3. **The Complicated System**

DEFINING PROPERTIES

1. **Diversity**
2. **Connectedness**
3. **Resilience**

THE COMPLEX SYSTEM

- **Diversity**
- **Connectedness**
- **Resilience**
- **Strong: task diversity**
- **Taut links and interdependence**
- **Preventive resilience**

THE MODULAR SYSTEM

- **Diversity**
- **Connectedness**
- **Resilience**
- **Weak: texture diversity**
- **Slack links; independence**
- **Recovery-elastic resilience**

THE COMPLICATED SYSTEM

- **Diversity**
- **Connectedness**
- **Resilience**
- **Strong functional Weak form**
- **Bounded: taut but formulaic**
- **Intensification Lower efficiency**

RELATIONSHIPS: THE 3 KINDS OF SYSTEM

- 1. The complex system needs the setting of a modular system**
- 2. The modular system needs the membership of complex systems**
- 3. The complicated system will break down unless it deintensifies**

Deintensification requires:

- 1. Simplification between its modules**
- 2. Complexity within its modules**
→ **efficiency gain**

**APPLICATION TO
TRADABLE ENERGY
QUOTAS (TEQs)**

CONTEXT

1. Climate change
2. Oil / gas depletion

WHAT DO WE NEED?

1. A guarantee that intended reductions in energy will be met
2. An energy *numéraire*
3. Entitlements to energy
4. A framework for cooperation

WHAT ARE TEQs?

Tradable Energy Quotas are
an electronic system for rationing
either carbon-rated energy
or individual scarce fuels
or both
for all energy users
at national level.

**All individuals receive an Entitlement to
TEQs units.**

**All other users obtain their units through
the weekly Tender.**

There is a rolling-annual Budget.

**Units are surrendered when energy is
purchased.**

**Individuals who use less than their
Entitlement may sell them.**

Those who want more may buy them.

THE RATING SYSTEM: The energy numéraire

Carbon units:

1 unit = 1kg CO₂ (gwp)

OR

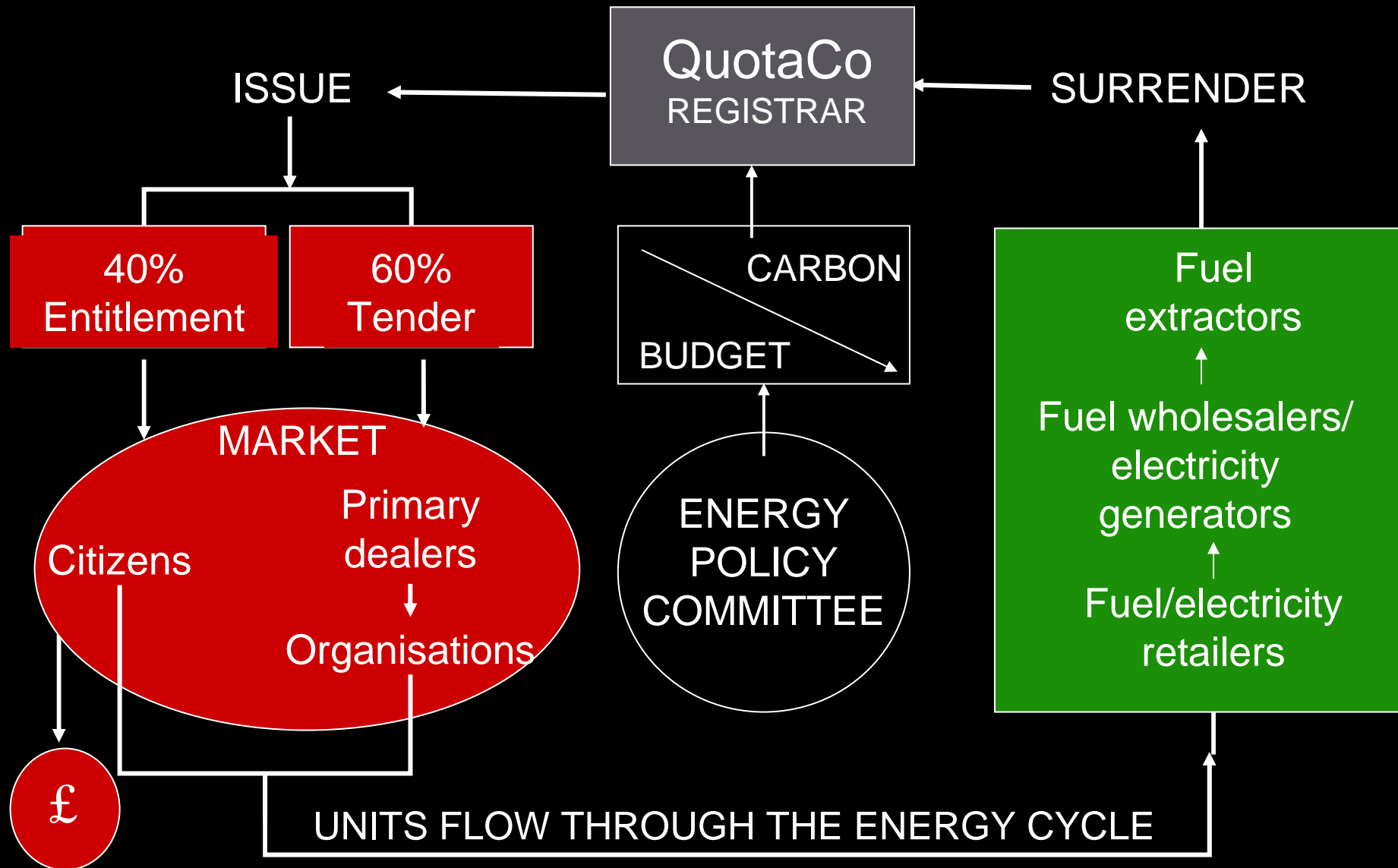
Fuel units:

1 unit = 1 litre oil

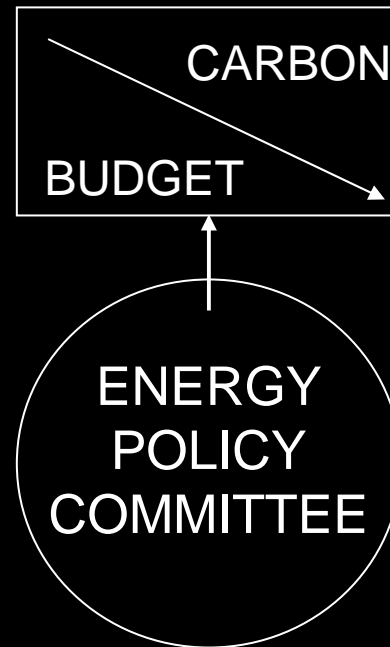
1 unit = 1 metre³ gas

1 unit = 1 kWh electricity (etc)

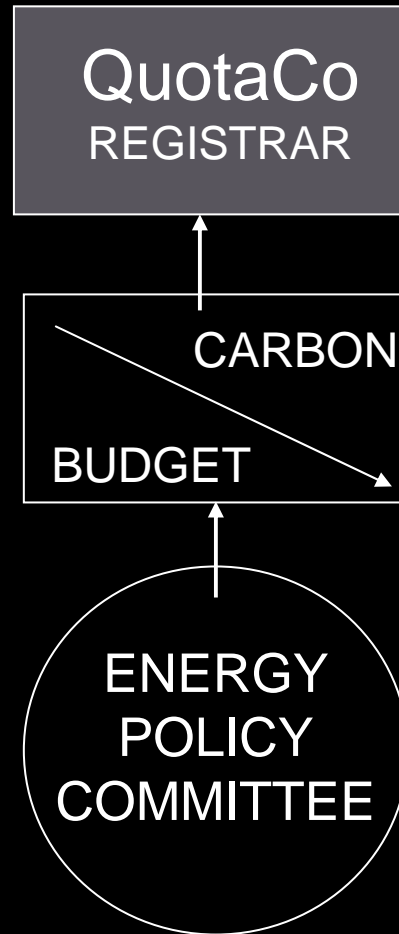
Tradable Energy Quotas



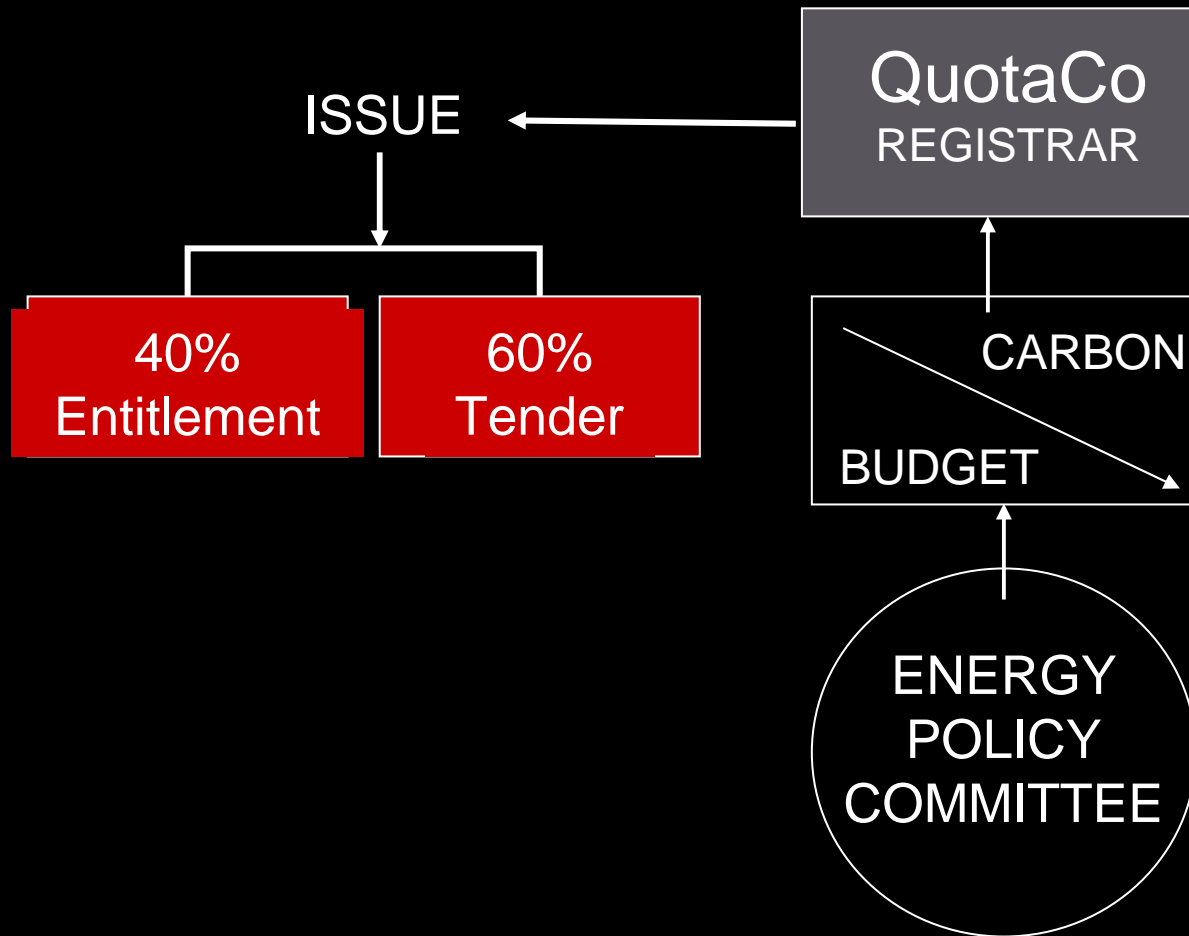
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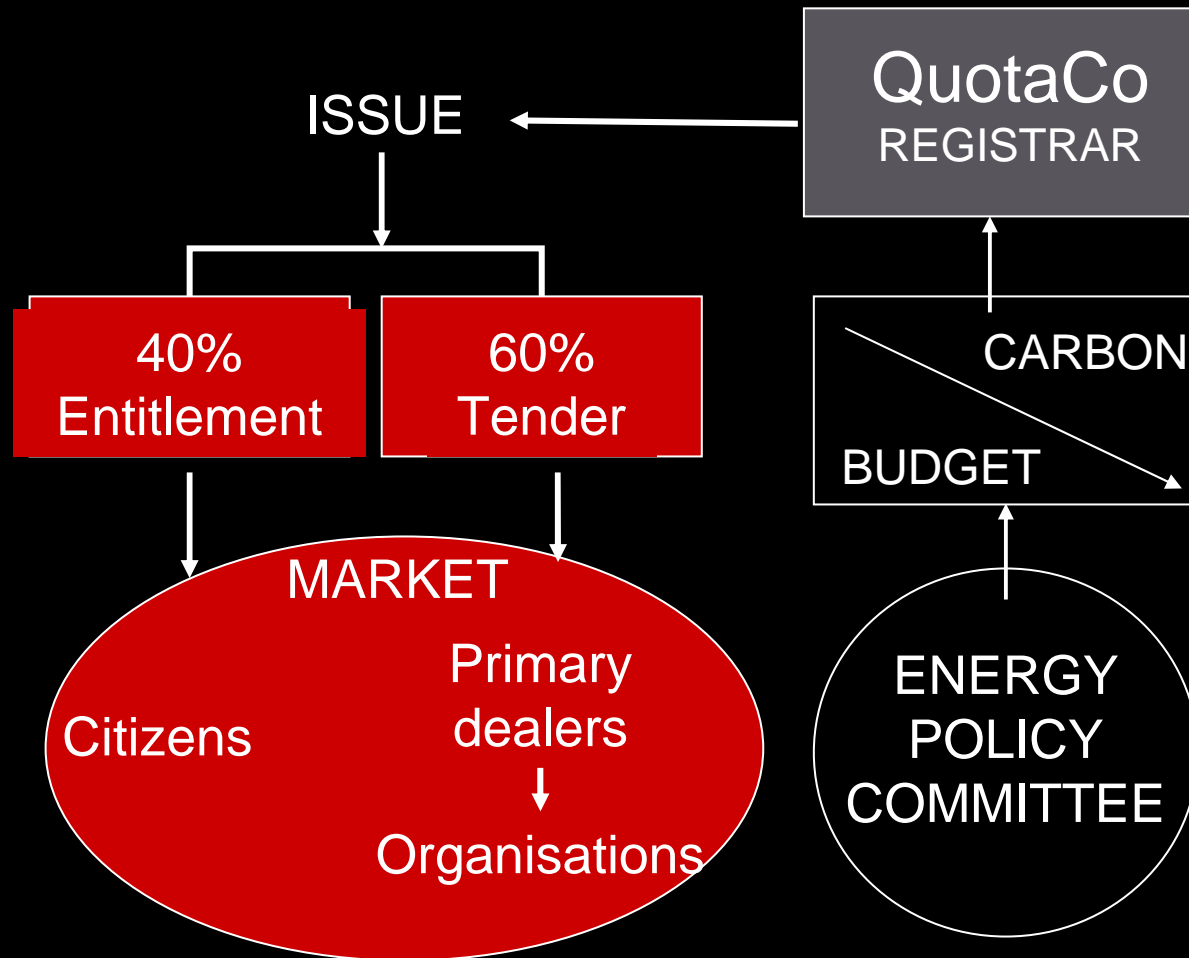
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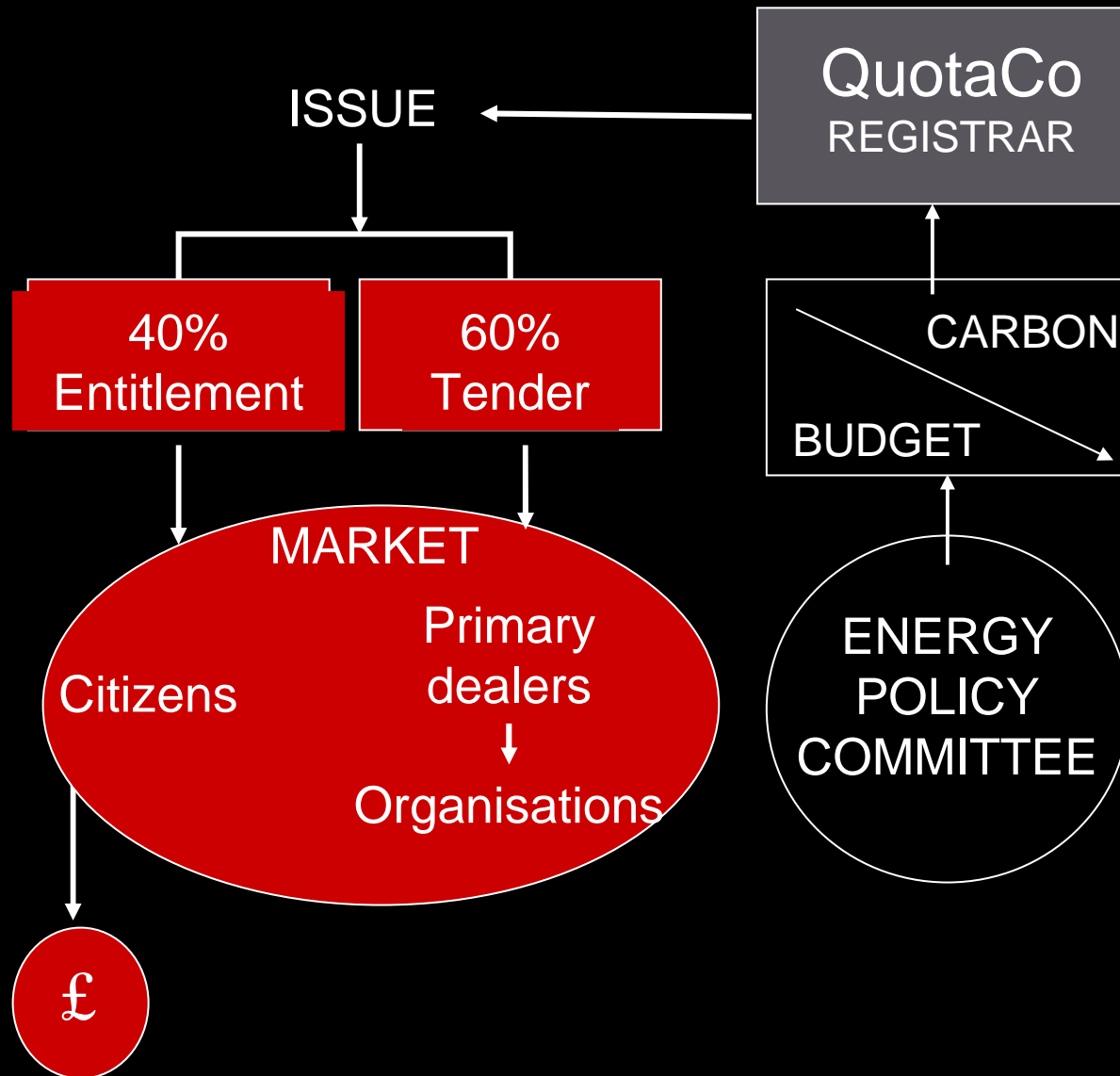
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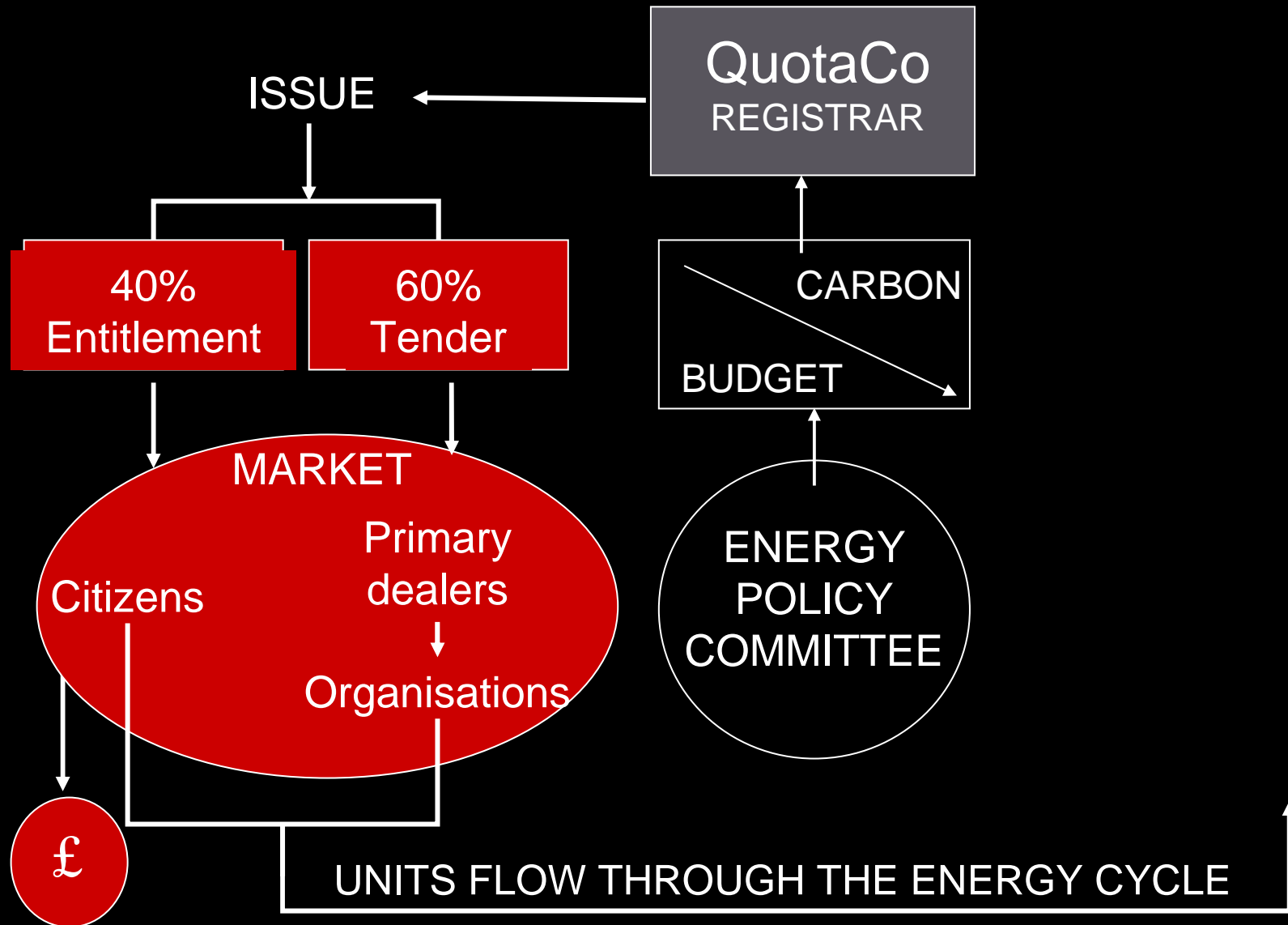
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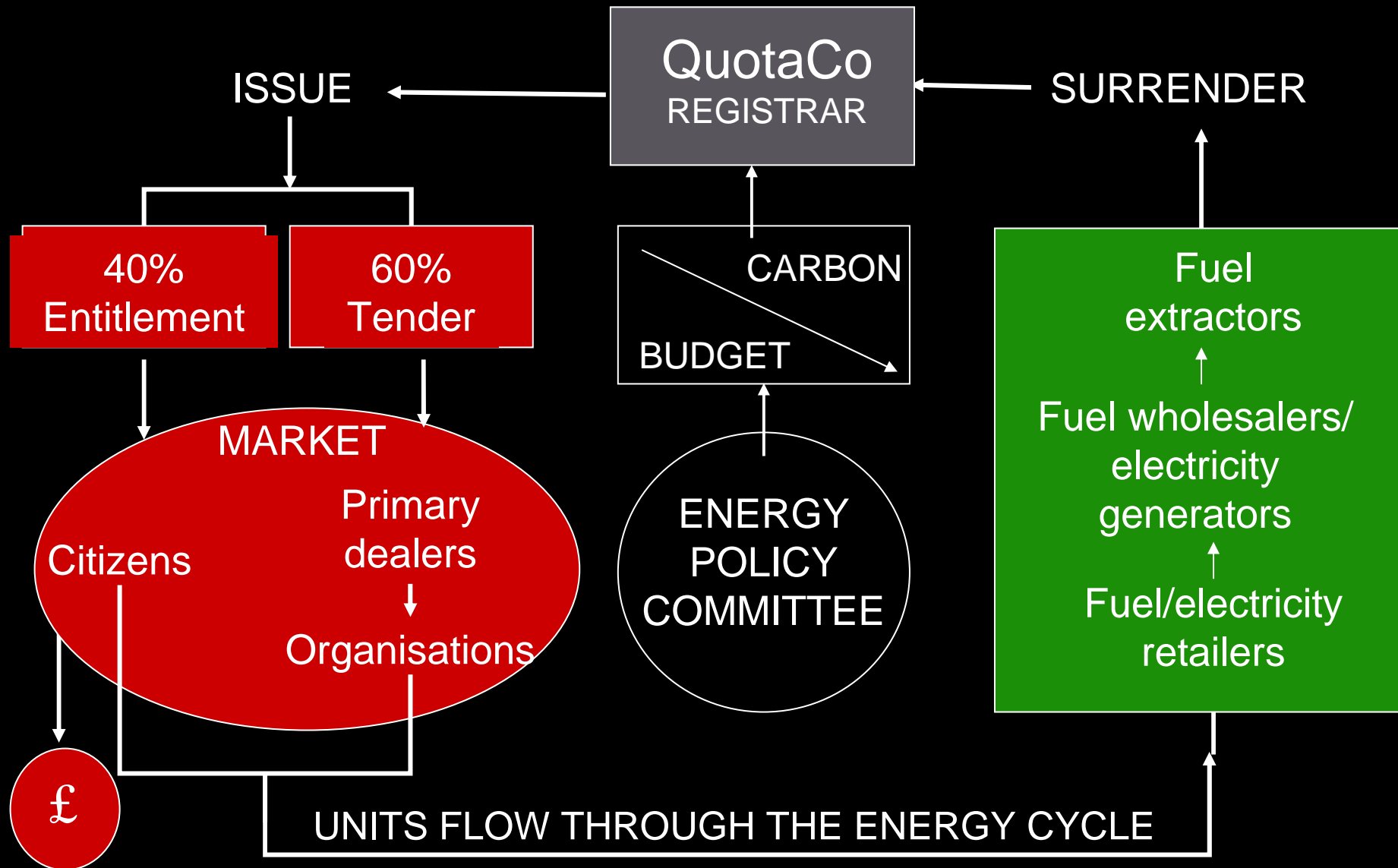
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TWELVE CONDITIONS

A GUARANTEE		

TWELVE CONDITIONS

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TWELVE CONDITIONS

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EQUITY		

TWELVE CONDITIONS

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EQUITY	AN ASSURED RATION	

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Common Purpose

**A shared aim to reach a shared goal:
where collective aims are advanced by
the individual purpose, and individual
aims advanced by the collective
purpose**

TEQS vs TAX

NO GUARANTEE	NO TIME TO PLAN AHEAD	TAKES MONEY FROM THE USER
REGRESSIVE	NO ASSURED RATION	SPECIFIED IN TERMS OF MONEY
WHOLLY UNSUITED FOR FUEL SCARCITY	NO OWNERSHIP	GOVERNMENT THERE TO PUNISH
COMPETITIVE DISADVANTAGE	PUSH	NO COMMON PURPOSE

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efficiency transformation

The system-scale rule

Large-scale tasks do not need a large-scale solution. They need small-scale solutions within a large-scale framework.

