Seminar on
African Electrical Interconnection

Module 2- Market Analysis

Module 2- Market Analysis

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1. Chapter I Economic Appraisal of the Interconnection Project: the Case of Pooling Generation Resources

2. Chapter II Demand analysis: the Case of Access to New Markets.

Module 2- Market Analysis
Chapter I Pooling Generation Resources

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2. The economic appraisal
3. Evaluating full operational costs
4. Other rationales
5. Complete cost/benefit analysis

Chapter 1 Pooling generation resources

The rationale

A first level of coordination and integration of electricity systems is reached through the pooling of generation resources

Benefits

- More efficient management of electricity systems
- Positive economic impact on the region

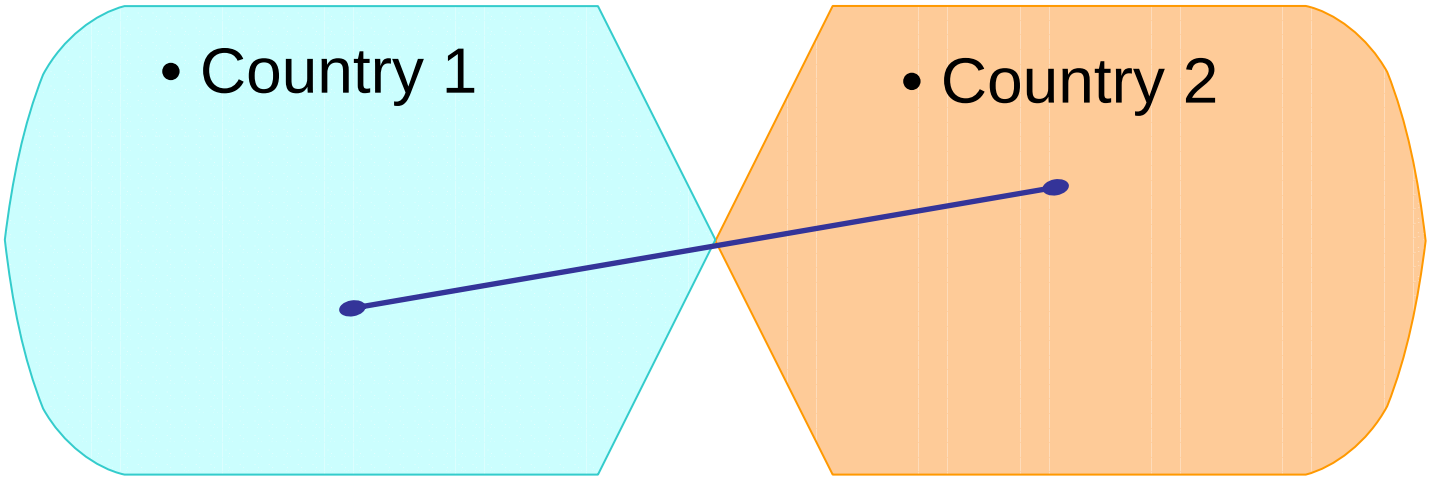
Chapter 1 Pooling of generation resources

The economic appraisal

The benefits of the pooling may be evaluated starting from a very simplified modeling of the national electricity systems in which:

- each system is made of a single production/consumptions point
- there is no network grid

“ Single bus bar system”



Chapter 1 Pooling of generation resources

The economic appraisal

Successful pooling of resources results in a saving of system management costs due to:

- More advanced technologies allowed by the integrated system
- More efficient generation management (complementary load profiles)
- Greater system reliability

Chapter 1 Pooling of generation resources

The economic appraisal

(single bus bar system)

Savings in operational costs = Sum of operational costs of the two systems - Operational costs of integrated system

Operational costs = Generation costs + Transmission costs + Failure costs

- Generation costs → Fuel costs
- Transmission costs → Parameter related to the dimension of the system
- Failure costs → Unserved load

One shot system : no investments

Chapter 1Pooling of generation resources

The economic appraisal

pooling of generation resources

Other benefits

- Reduced need for new capacity
- Reduced need for reserve capacity
- Higher system reliability -> positive impact on the economy
- Cooperation benefits

Chapter 1
Pooling of generation resources
Evaluating full operational costs

Simplified single bar system

Electricity network

Full electricity system

It is essential to evaluate the investments needed to match the two grid systems

Chapter 1
Pooling of generation resources
Other rationales

better efficiency and co-ordination of economic initiatives

better economic system management

exploitation of common primary resources

transfer of electricity from one country to another

other political objectives (strengthening political stability through regional co-operation and integration)

Chapter 1 Pooling of generation resources

Complete cost/benefit analysis

The whole impact of the project need to be evaluated:

technical operational costs (incl. investments)

impact on demand structure (sectorial/regional)

potential for "suppressed demand"

demand function (ability to pay)

impact on socio-economic parameters

potential externalities (environment, future generation etc..)

The estimation may be quite complicate

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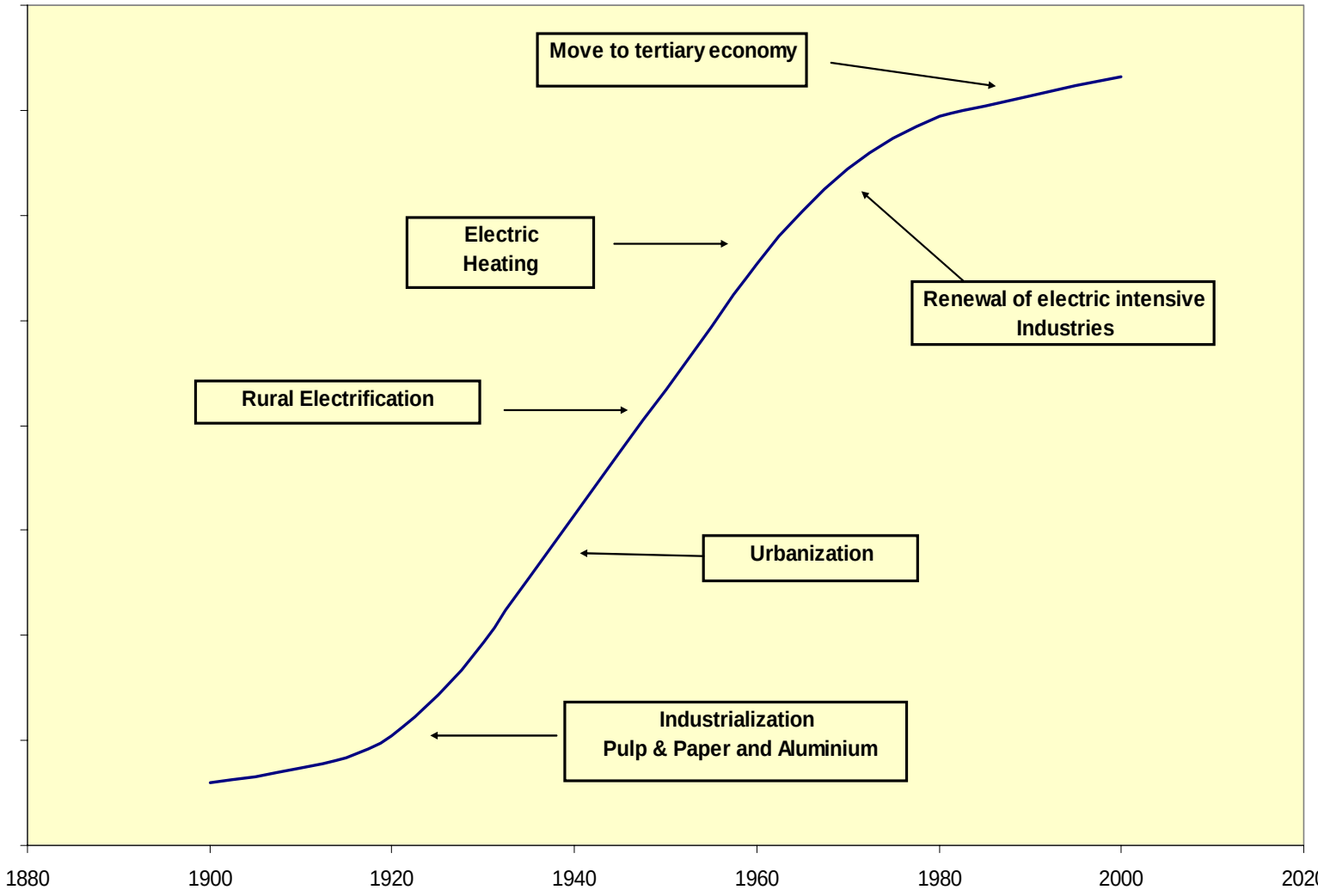
Module 2- Market Analysis

Chapter II Demand Analysis: the Case of Access to New Markets

Contents

- Energy Demand Modelling
- Energy Demand Forecast
- Ability to Pay and Tariff Setting

Historical trend: The case of Quebec



Chapter 2 Demand Analysis
Energy Demand Modelling

Models identify the link between socio-economic variables and electricity demand

- reflects the analyst perception of this link
- the more specific (targeted to homogeneous areas) the more trustable the model
- results depend on the underlying hypothesis
  great care to be paid in transferring the model in different areas or time period
- no way to predict break-even points or structural changes

Chapter 2 Demand Analysis
Energy Demand Modelling

Econometric Models	➢ Socioeconomic explicative vbls ➢ Mathematical functional relationship
Technico-economic Models	➢ Demand for durables is the explicative vbl ➢ Relevance of technology
General equilibrium Models	➢ Combine macroeconomic and technical approach

Econometric Method

- **relates energy sales to socio-economic explanatory variables**

Sales GWh (t)= a + b1(demographic indicator,t) + b2(economic indicators,t)

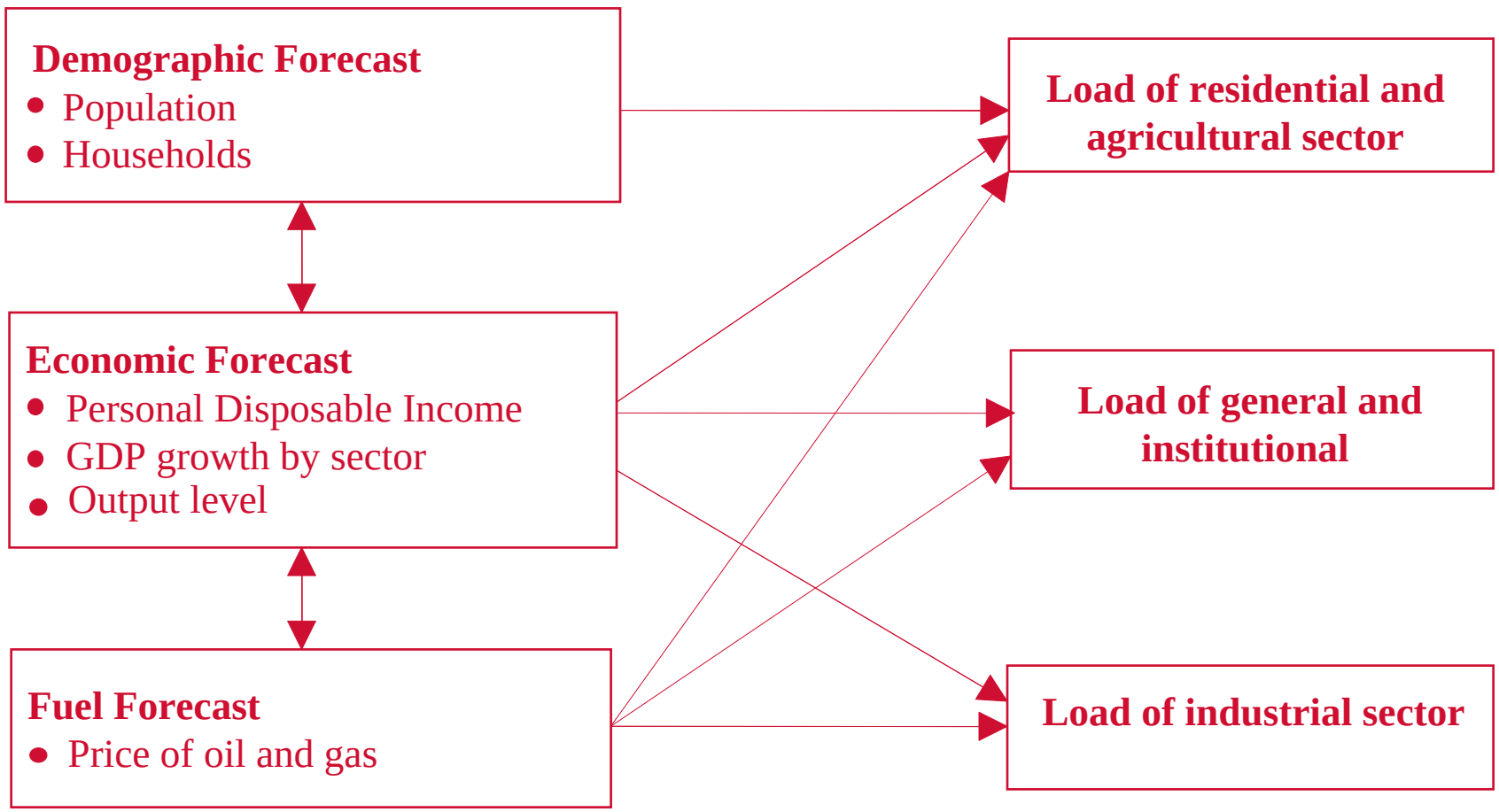
- **one assumes the existence of stable relationships between energy demand and explanatory variables (GDP, population,households…)**

- **one needs long historical series**

Technico-economic model

- Demand for durables is the explicative variable
- Depends on the technology. Different technology will result in different energy and electricity intensity.

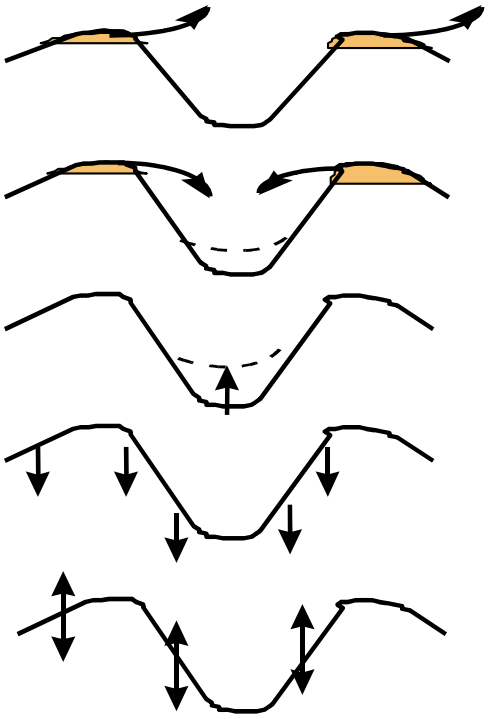
General Equilibrium Model



Important elements

		Residential	Commercial	Industrial
Structural long term	**Economy**			
	GDP tertiary		●	
	GDP industrial			●
	Disposable Personal Income	●	●	
	New Construction	●		
	Demography			
	Population	●	●	
	Number of households	●		
Risks mid term	**Tariffs**	●	●	●
	Competition	●	●	
	Industrial Projects			●
	DSM	●	●	●
	Electro-Technology			●

DSM measures



Load shaving

Load shifting

Valley filling

Load reduction

Strategic load

Chapter 2 Demand Analysis
Energy Demand Forecast

Demand model based on present vbls → Demand model in the future

Forecasting is a very delicate operation

Great care to be paid at:

Structural changes affecting the demand model

Reliability of available data

Potential for suppressed demand

Chapter 2 Demand Analysis
Energy Demand Forecast

The Scenario approach

Demand model over present vbls

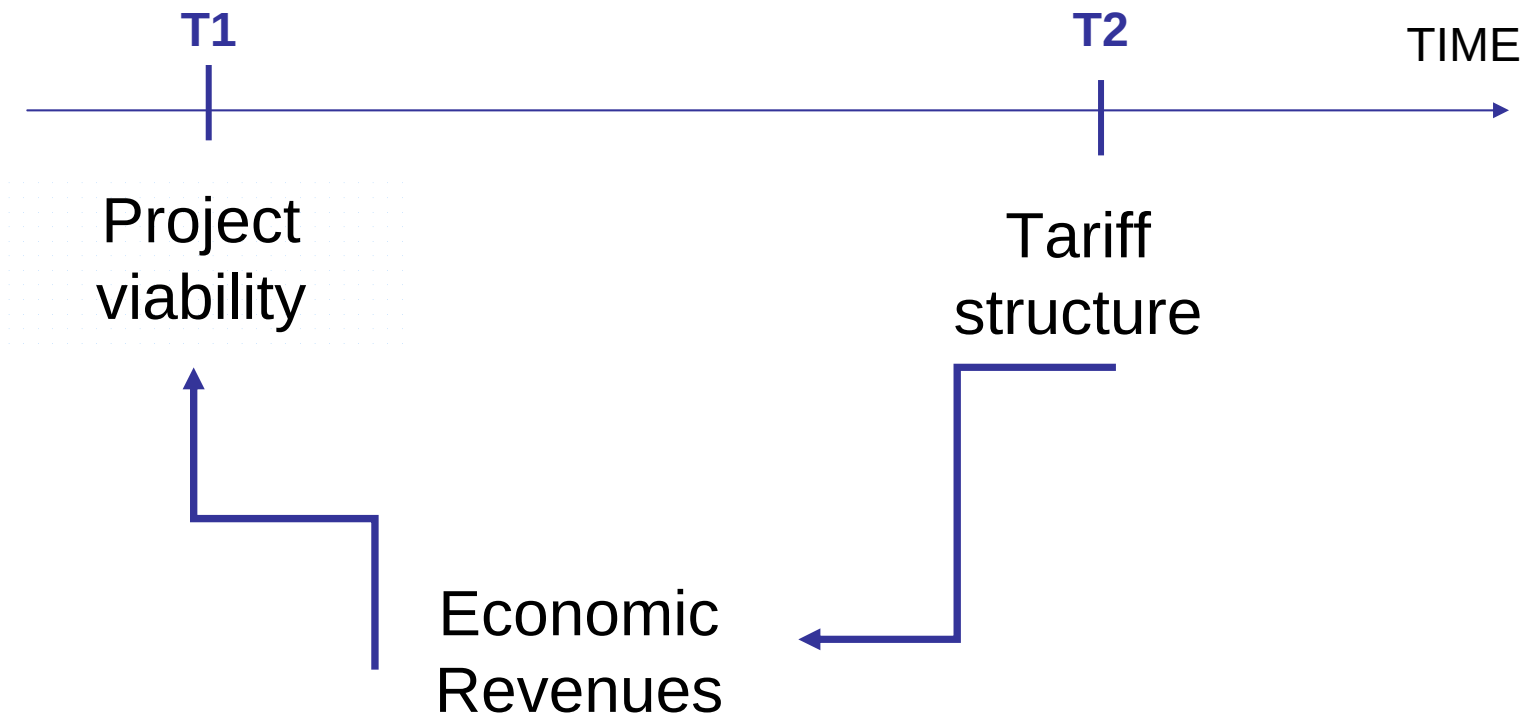
Future demand scenario “low”

Future demand scenario “medium”

Future demand scenario “high”

Chapter 2 Demand Analysis

Ability to Pay and Tariff Setting



Need to evaluate the impact of different tariff structures

Chapter 2 Demand Analysis
Ability to Pay and Tariff Setting

Different tariff structures

→ Different economic return

→ Different impact on other relevant objectives

- Socioeconomic objectives
- Ability/willingness to pay