

PN-AAU-262

ISN 43265

TUNISIAN ENERGY CONSUMPTION STUDY

PRELIMINARY PROGRAM

COMMERCIAL/INSTITUTIONAL AND RESIDENTIAL SECTORS

---

Mr. Kemal Rekik  
Charge de Mission  
Ministry of National Economy

And

Mr. Richard Stevenson  
Office of Science and Technology  
United States Agency for International Development

By

The Energy Working Group  
Ministry of National Economy

004598

000212  
S

TUNIS  
January 30, 1981

## TABLE OF CONTENTS

## Executive Summary:

## 1. INTRODUCTION: OVERVIEW OF THE PLANNING VISIT

- 1.1 Origin and Goal of the Study
- 1.2 Purpose of the Planning Visit
- 1.3 Activities of the Working Group

## 2. ENERGY SECTOR DEFINITION

- 2.1 General Introduction
- 2.2 Commercial - Institutional Sector
- 2.3 Boundary Definition Problems and Suggested Solutions
- 2.4 Residential Sector
- 2.5 Boundary Definition Problems and Suggested Solutions

## 3. SECTORIAL DATA REQUIREMENTS

- 3.1 General Introduction
  - 3.1.1 Energy Policy Research Goals
  - 3.1.2 Operational Data Table
  - 3.1.3 Demographic Energy, Structure, and other Data Categories
- 3.2 Commercial - Institutional Data Requirements
  - 3.2.1 Operational Data Table
    - 3.2.1.1 Tourism Sub-Sector
    - 3.2.1.2 Health Sub-Sector
    - 3.2.1.3 Education Sub-Sector
    - 3.2.1.4 Commercial Establishment Sub-Sector
- 3.3 Residential Data Requirements
  - 3.3.1 Demographic, Energy, Structure, and other Data Categories
  - 3.3.2 Operational Data Table
  - ~~3.3.3 Sectorial Questionnaire~~

## 4. EXISTENCE, APPLICABILITY AND AVAILABILITY OF REQUIRED DATA

- 4.1 Objective of this Data Assessment
- 4.2 Data Assessment for the Commercial - Institutional Sector - Only in Form L 2/181
- 4.4 Data Assessment for the Residential Sector

## 5. DATA TO BE COLLECTED

- 5.1 General Introduction
- 5.2 Commercial - Institutional
- 5.3 Residential Sector

6. DATA COLLECTION STRATEGIES

- 6.1 Overview of the Need for Data Collection Strategy
- 6.2 Data Collection Problems
- 6.3 Commercial - Institutional Sector Recommendations and Options
  - 6.3.1 Tourism Sub-Sector
  - 6.3.2 Health Sub-Sector
  - 6.3.3 Education Sub-Sector
  - 6.3.4 Commercial Establishments Sub-Sector
  - 6.3.5 Other Commercial - Institutional Sub-Sectors
- 6.4 Residential Sector Recommendations and Options

7. SUGGESTED IMPLEMENTATION PLAN

- 7.1 Suggested Study Objectives
- 7.2 Overview of Strategy
- 7.3 Scope of Work
  - 7.3.1 Preliminary Assessment of Existing Data
  - 7.3.2 Preconditions to Data Collection
  - 7.3.3 Implementation of Data Collection
    - 7.3.3.1 Preliminary Operations
    - 7.3.3.2 Data Collection
    - 7.3.3.3 Data Processing
    - 7.3.3.4 Analyses and Publication of Results
- 7.4 Work Plan and Schedule Options
  - 7.4.1 Residential Sector
  - 7.4.2 Commercial - Institutional Sector
    - 7.4.2.1 Education Sub-Sector
    - 7.4.2.2 Health Sub-Sector
    - 7.4.2.3 Tourism Sub-Sector
    - 7.4.2.4 Commercial Establishments
  - 7.4.3 Illustrative Schedule
- 7.5 Training
- 7.6 Project Organization
  - 7.6.1 Structure of the Working Group
  - 7.6.2 Notes on the Structure of the Working Group
  - 7.6.3 Functions of the Working Group
- 7.7 Project Management

8. SHORT-TERM ACTIVITIES - Only in French 2/9/61, working group

## 1. INTRODUCTION: OVERVIEW OF THE PLANNING VISIT

### 1.1. Origin and Goal of the Study

Working jointly with the Government of Tunisia (GOT) the United States Agency for International Development (USAID) has authorized the conduct of a cooperative project of U.S. specialists to conduct sectoral studies to develop better energy use data. The basic goal of the <sup>project</sup> ~~study~~ is to assist the GOT to improve its capability to carry out comprehensive energy policy analysis and planning by assuring the availability of energy consumption data for the residential, commercial - institutional, agricultural, transport, and industrial sectors. This general goal is to be achieved via sector-specific studies. The particular objective of these studies is to provide Tunisian planners with data on total energy consumed by sector, type of energy, end-use, and price. These data will then be used to develop Government Energy Policy in three areas: conservation, greater utilization of renewables and modification of pricing structures.

### 1.2. Purpose of the Planning Visit

The basic objective of the planning visit to Tunis by Mr. Bertrand Chatel, Mr. Jim Gibbs and Mr. David Tyler was to assess the existence ~~and~~ and the availability of energy consumption, demographic and socio-economic data required for the successful conduct of the commercial- institutional and residential sector studies. In addition, the U.S. specialists made recommendations about how to carry out these studies. Working under the direction of Mr. K. Rekik and Mr. R. Stevenson, the U.S. specialists performed their activities within the context of a Tuniso-American energy working group, under the Ministry of the National Economy.

### 1.3. Activities of the Working Group

The working group brought together Tunisians and Americans with varying levels of expertise and experience in energy-related data collection. The working group was charged with a number of responsibilities, and this report represents a summary of its findings and recommendations during the period of January 12-19, 1981. Basically, the group's responsibilities consisted of:

1. Defining the limits of the commercial - institutional and household sectors.
2. Specifying, within the context of the general data requirements above, the exact data required to satisfy the needs of Tunisian planners.
3. Determining what data already exists, its quality, and its applicability to the larger planning goals.
4. Specifying the data not currently available in usable form.
5. Determining the best methods and vehicles for collecting data, considering cost and reliability.
6. Developing a series of implementation plans and options to be presented to Tunisian planners.
7. Determining what activities need to be taken in the short-term.

## 2. ENERGY SECTOR DEFINITION

### 2.1. General Introduction

The Tunisian economy is generally divided into a number of sectors for the purposes of statistical reporting and planning. The sectoral labels used for this project are found on page:

- Residential
- Commercial - Institutional
- Agricultural
- Transportation
- Industry

This particular planning visit dealt primarily with two of the sectors, residential and commercial - institutional. However, other sectors (and their boundaries) were considered insofar as the possibility existed for overlap between sectors. Precise sectoral definition was viewed as a necessary and first step of the visit. The position was taken that all economic activities must be included in only one sector, and concurrently that each activity have a sector in which to be placed. This avoids the problem of either double counting an activity (for example, including bakeries in both "industry" and "commerce") or not counting an activity at all (for example, excluding bakeries from all of the aforementioned sectors) This activity, specifying sectoral boundaries, is referred to as defining the statistical universe and must be done prior to beginning survey-data collection activities.

### 2.2. Commercial - Institutional Sector

The Commercial - Institutional Sector includes the non-residential buildings utilized for business, administrative, and institutional activities in both, the public and private sectors.

For instance, this sector includes such activities as: construction, financial institutions, insurance companies, business offices, and shops of all types.

Public administration is also part of this sector, including: telecommunications, post offices, telegraph, telephones, radio and TV agencies, ministries, governmental agencies, regional and municipal offices and services, education ministries, schools, colleges and universities, libraries, museums, health ministry and services, hospitals, health centers, ministry of tourism, hotels, and restaurants, etc.

The sector includes the electric, gas, and water public utilities as well as the sewerage services and other energy utilities for coal distribution and other sources of energy.

It also includes cultural and religious institutions, such as mosques and churches. Leisure activities, such as cinemas, theatres, sport facilities, swimming pools, etc., constitute another sub-sector.

The list of activities included in the commercial - institutional sector is detailed in ANNEXE 5.

### 2.3. Boundary Definition Problems and Suggested Solutions: Commercial/ Institutional Sector

Three types of boundary definition problems are identified with respect to the commercial - institutional sector:

1. Whether a specific economic activity is part of the commercial or industrial sector (for example bakeries and bread sellers);
2. Whether a specific economic activity is part of one commercial subsector or another (for example, are Turkish baths/hammans in the leisure or health sub-sector?).

Commercial/industrial boundary problems are best resolved on a case by case basis, taking into consideration current Tunisian classification methods. With respect to #1 above, the working group found that bakeries are generally considered to be industrial, while bread sellers are considered to be commercial. It is suggested that these classifications be maintained for the current project. At the same time, the working group notes the need to be alert to future commercial/industrial boundary problems and to methods of resolving such problems as they arise.

Commercial/residential boundary problems (#2 above) will be resolved by considering such establishments to be commercial for sampling purposes. INS (Institut National de Statistiques) reported that mixed commercial/residential units are very rare in Tunisia, but if they are encountered during fieldwork, enumerators will be instructed to ask about energy consumption only for the commercial activities of the unit.

The precise sub-sector placement of clearly commercial establishments (#3 above) is not a problem of major proportion and will be resolved by the working group on a case-by-case basis. The important point, as with the larger sector - sector boundaries -, is that all commercial establishments be clearly placed in one (and ONLY one) of the sub-sectors.

#### 2.4. Residential Sector

As a result of the first energy consumption study planning visit (December, 1980), it was decided that, for both logical and operational reasons, the separate rural and urban household studies should be considered and conducted as a unified activity. This report reflects that consensus.

For the purposes of this study, the residential sector generally consists of all units intended for human habitation, excluding mixed residential/commercial units (these are considered to be part of the commercial sector). The precise, operational definition of the residential sector will be developed in collaboration with INS experts.

#### 2.5. Boundary Definition Problems and Suggested Solutions: Residential Sector

Two types of boundary definition problems are identified with respect to the residential sector:

1. Potential overlap with the commercial sector (see 2.3., page 6);
2. Potential overlap with the agricultural sector.

Rural households in Tunisia are generally engaged in agriculture. This means that heads of rural households will have to be asked to separate agricultural energy consumption (used for irrigation, lighting and heating of barns, and crop drying) from household energy consumption. STEG (Societe Tunisienne de l'Electricite et du Gaz) reported that irrigation pumps are metered separately, but data on other end uses may be difficult to obtain.

In addition, this residential/agricultural overlap might affect the development of the household survey sample design. That is, a component of agricultural data collection activities might be a farm-level survey of energy consumption. If a farm-level survey is recommended in the agricultural sector, it may be most cost-efficient to design a rural household sample that also would provide reliable data on energy consumption for agricultural activities. Operationally, the questionnaire would then consist of the standard household questionnaire plus a farm/operator/agricultural module. Before the feasibility of such an approach can be determined, it is first necessary to see if the agricultural sector data requirements necessitate a farm-level survey and also to consult mathematical statisticians regarding the viability of a multi-purpose sample design.

### 3. SECTORIAL DATA REQUIREMENTS

#### 3.1. General Introduction

After the definition of sectoral boundaries, the most logical step is to define sectoral data requirements. This consists of determining the variables (and their inter-relationships) that Tunisian energy planners have identified as analytically necessary for planning purposes. These variables should be displayed in tabular form, just like the output tables normally used during analysis. The product of this activity is a draft questionnaire that is correctly devised for the tabulation/analysis plan, not the reverse. Questionnaires must be devised from tabulation/analysis plans in order to ensure that:

- all the data requirements are being met, and
- superfluous data is not being collected.

##### 3.1.1. Energy Policy Research Goals

The basic goal of this project is to improve the GOT capability to carry out energy policy planning by providing comprehensive and accurate data. The data will be used to develop energy policy in three areas: conservation, greater utilization of renewable energy sources, and modification of fuel pricing structures. The data required by planners are total energy consumption by:

- Sector
- Type of fuel
- Price of fuel
- End use

##### 3.1.2. Operational Data Table

Given the above data requirements, it is possible to construct analytical model of the ideal data table. This table, produced by sector, subsector, location, seasonal variation, size of establishment, demographic variables, etc, would appear as follows and would contain price and consumption information:

MODEL TABLE

Fuel Type (End Type)	Heating	Lighting	(Others-as appropriate for sector and Subsector)	Total
Electricity				
Petroleum Products				
Natural Gas				
Non-Commercial Fuels				

Obviously, this model table, which represents total aggregated sectoral energy consumption, requires fuel type and end use modification depending upon the sector or subsector being studied. Also, the studies are significantly more comprehensive than simply "filling the blanks" sector by sector. However, the model table is nonetheless a useful tool in that it focuses the study and provides a point of departure for further elaboration of data requirements.

### 3.1.3. Demographic, Energy and Other Data Requirements

As mentioned above, the sector or subsector specific data table will be produced for a number of dependent variables (size of structure, number of inhabitants/employees, region, etc.). While the data table itself satisfies the energy data requirements, the other data requirements must be specified prior to beginning data collection activities. For example, if it is analytically important to produce the household energy consumption table by average household income, then average household income must be included on the residential questionnaire.

These additional data requirements can generally be divided into three groups for the residential and commercial/institutional sectors:

1. Demographic data, such as number of employees or residents geographical region, etc., (clearly the list is much larger for the residential sector and will include such things as household incomes, occupations, etc.).
2. Structure data, such as floor space, construction materials, etc.
3. Other data, such as seasonal variation types of end use devices and attitude and opinion data, such as reason for using specific fuels, ability to charge fuels, willingness to pay more, etc.

### 3.2. Commercial/Institutional Data Requirements

#### 3.21. Demographic, Energy, Structure and Other Data Categories

The demographic data considered necessary for the study are:

- location of structure (region)
- Type of commercial or institutional establishment
- Number of occupants

The essential energy consumption data are:

- Total consumption per fuel type
- Total price per fuel price
- Total consumption per end use

The important structure data are:

- Floor area
- Number of floors
- Construction materials
- Year of construction



The data requirements specifically establish the different ways the table will be provided (i.e. by type of establishment, region, number of occupants/employees, etc.)

The commercial/institutional sector is divided into a number of subsectors. Each of these subsectors (and sometimes, groups within a subsector) will need a model table specific to its characteristics, especially end use. During the planning visit, considerable information was obtained on four subsectors:

1. Tourism
2. Health
3. Education
4. Commercial Establishments

3.221. Tourism Subsector

The model data table for the tourism subsector should probably be constructed such that the end use categories of "cooking" and "water heating" are separate given the demand for hot water for bathing purposes in hotels. Likewise, the use of noncommercial fuels in hotels is probably rare. The data table for the tourism subsector may then appear somewhat as follows:

Model Table: Tourism Subsector

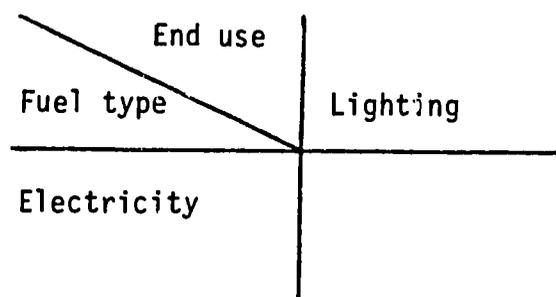
Fuel type/ End use	Cooking	Water Heating	Space Heating	Space Cooking	Other	TOTAL
Electricity						
Gas (Piped)						
Gas (Bottled)						
Kerosene						
Other						

### 3.222. Health Subsector

The health subsector consists of hospitals and primary health care centers. The latter are discussed in greater detail in Section 6.3 with reference to data collection specifications and options. Hospitals, it is expected, would require a model data table very similar to the sector model presented on page \_\_\_\_\_. Non commercial fuels can be eliminated if they aren't used in hospitals, and the "specialized equipment" end category may require some modification, but the sector model appears to be basically usable.

### 3.223. Education Subsector

The education subsector for which instruction is presently known consists of primary schools and secondary schools. Separate data tables will be necessary for each of these groups within the subsector. The only energy consumption in primary schools is electricity for lighting, so the data can therefore be displayed in tabular fashion as follows with the entries being quantity and price.



Secondary schools, because of food preparation and the boarding of students, can be expected to have fuel types and end uses more in keeping with the sector model.

### 3.224. Commercial Establishments Sub-Sector

Commercial establishments represent a very large subsector and will undoubtedly require several questionnaire and model table designs. These are expected to be concrete distinctions required for end use from, for example, a tobacco shop to a Turkish bath to a restaurant.

### 3.3 Residential Data Requirements

#### 3.31. Demographic, Energy Structure and Other Data Categories

The demographic data requirements in the residential sector that have thus far been identified as essential by the working group are:

- Region of country
- Number of occupants
- Occupation of principal wage earners
- Household Income

The energy consumption data determined as necessary are:

- Total consumption per fuel type
- Price paid per fuel type
- End use of fuels within the household

The structure data required are:

- Type of dwelling
- Floor area
- Number of floors
- Building materials
- Year of construction

The other data required are:

- Reason for using one fuel type instead of another (others)
- Types of end use devices found in the household.

#### 3.23. Operational Data Table

The above energy consumption data requirements can be translated with the following model table for the residential sector. Ideally, the table will contain price and amount for each fuel type and end use.

Model Table: Residential Sector

Fuel type (end use)	Cooking/Water Heating	Lighting	Space Heating	Space Cooking	Other	Total
Electricity						
Gas (piped)						
Gas (bottled)						
Kerosene						
Wood						
Charcoal						
Other						

The demographic and housing structure data requirements specifically establish the different ways the table will be produced (i.e., by household income, region, age of dwelling, etc.)

#### 4. EXISTENCE, APPLICABILITY AND AVAILABILITY OF REQUIRED DATA

##### 4.1 OBJECTIVE OF THIS DATA ASSESSMENT

The working group spent considerable time assessing the data currently available in Tunisia and its applicability to the research goals. This was done for three reasons:

1. To determine if the data required for this project already exist or can be readily abstracted from existing data. For example, in the tourism subsector of commerce, if hotels were found to routinely report total energy consumption to a central office then the scope of the questionnaire for that subsector could be narrowed.
2. To become aware of the methods, procedures and problems associated with past surveys conducted in Tunisia. This was particularly important in the residential sector. The working group had to determine, for example, the ease with which household income data can be obtained through surveys. If this information is difficult to obtain, alternative means must be found to gather it or new methods developed for this study.
3. To become aware of the existence of resources that can be used as sampling frames for sector or subsector sample surveys. For example, the 1980 INS survey of population and employment which was carried out nationwide with 60,000 households in the sample can be used as a frame to design the sample for the residential sector study. Likewise, lists of commercial establishments by functional groupings could be used in the same fashion.

## 4.2. Evaluation des Données du Secteur Commercial

### 4.2.1. Tourisme

L'Office National du Tourisme Tunisien (ONTT) dispose de données importantes sur les hôtels et les programmes annuels de constructions d'établissements touristiques, et a offert de compléter ces données pour préciser les consommations d'énergie par usage:

- (a) Consommations d'énergie des hôtels  
L'ONTT a indiqué qu'il pourrait demander aux divers hôtels leurs consommations annuelles d'énergie en précisant par un questionnaire les ventilations souhaitées par usage final. Le groupe de travail pourra établir la liste de ces usages en étroite coopération avec l'ONTT et décider du mode de collecte des données par recensement ou sondage.
- (b) Consommations pour les Constructions d'Hôtels  
L'ONTT contrôle un programme important de construction d'hôtels dont il réalise l'infrastructure (routes d'accès, génie civil, aménagements d'électricité, d'eau, évacuations sanitaires, etc.) en vue de viabiliser les terrains, probablement en coopération avec le Ministère de l'Équipement.  
Les hôtels sont construits par le secteur privé pour 95 % et l'État pour 5 %. L'ONTT pourra obtenir les consommations annuelles d'énergie, ventilées par usage final, pour la réalisation des infrastructures et pour la construction des hôtels.

Une liste des usages finaux pourra être établie conjointement par le groupe de travail et un représentant de l'ONTT.

### 4.2.2. Sociétés Pétrolières de Distribution

Les sociétés pétrolières disposent de nombreuses statistiques de vente de produits pétroliers, ventilées par ville, par type d'utilisation, et par type de consommateur. Ces données ne sont pas ventilées par usage final.

Le groupe de travail pourra établir une lettre demandant à la Société Nationale de Distribution de Pétrole (SNDP) et aux Présidents des Chambres Syndicales du Pétrole et du Gaz de communiquer leurs statistiques existantes qui pourront servir pour le recoupement des données obtenues par ailleurs par le groupe de travail sur la consommation des produits pétroliers par usage final.

### 4.2.3. Commerces

- (a) L'Institut National de la Statistique (INS) a entrepris un recensement des établissements commerciaux en 1975 - 1978, et va en commencer un autre le 15 Février 1981, qui sera entrepris porte à porte dans tout le pays. Ce travail fondamental pourra servir de base pour l'enquête sur les consommations d'énergie par les établissements commerciaux. Le groupe de travail pourra établir, avec l'INS, la liste des usages finaux à considérer pour les commerces afin que l'INS puisse compléter le plus rapidement possible, son recensement des établissements commerciaux, en y incluant les données relatives aux consommations d'énergie par usage final.

- (b) L'Union Tunisienne de L'Industrie, du Commerce, et de l'Artisanat (UTICA) a établi un répertoire détaillé des commerçants par métiers ou professions, regroupés en 4 catégories:
- (i) petits commerçants;
  - (ii) petits artisans;
  - (iii) services;
  - (iv) industries.

Ce répertoire très complet pourra être utile pour raffiner la codification des commerces. De plus, l'UTICA a offert d'interroger les présidents d'associations de ces métiers et professions pour leur demander des informations telles que le nombre des minotiers, avec stratifications par région, par effectifs d'employés, etc.. Ces informations seraient utiles pour la préparation des échantillons pour les enquêtes par sondage auprès des établissements commerciaux.

#### 4.3. Evaluation des Données du Secteur Institutionnel

##### 4.3.1. Santé

- (a) Le Ministère de la Santé dispose d'informations sur les budgets et les dépenses des 100 hopitaux Tunisiens, ainsi qu'une étude analytique des dépenses d'un hopital échantillon. Ce données pourraient servir de base pour l'établissement d'un questionnaire sur la consommation d'énergie par usage qui serait adressé aux gérants d'hopitaux par recensement ou par sondage.
- (b) Le Ministère de la Santé administre également 650 centres de santé de base, dont la plupart sont sans électricité, une enquête sur la consommation d'énergie par usage de ces centres devra être envisagée par le Ministère de la Santé, en liaison avec le groupe de travail, particulièrement sur les divers combustibles utilisés y compris les combustibles non-commercialisés.

##### 4.3.2. Ministère de L'Education Nationale

Le Ministère de L'Education Nationale administre 2.630 écoles primaires et 220 établissements secondaires. Il dispose d'information concernant cet ensemble statistique, et certaines de ses consommations d'énergie, mais sans affectation à un usage final.

Une enquête par sondage pour les écoles primaires et par recensement pour les écoles secondaires pourra être préparée par le Ministère de L'Education Nationale, en liaison avec le groupe de travail et l'INS.

#### 4.3.3. Ministère de l'Intérieur, Service des Collectivités Locales

Le Service des Collectivités Locales du Ministère de l'Intérieur peut contribuer à l'enquête sur les consommations d'énergie, en liaison avec le groupe de travail et la STEG dans les domaines suivants:

- (i) Consommation en électricité des collectivités locales, notamment pour l'éclairage public, en coopération avec la STEG;
- (ii) Etudes sur les chauffages au gaz, au mazout, au bois, et autres des collectivités locales;
- (iii) Informations statistiques sur la composition de l'ensemble statistique des collectivités locales, en vue de préparer un échantillon pour une enquête par sondage.

#### 4.3.4. Ministère de l'Equipement

Le Ministère de l'Equipement est responsable de la réalisation de toutes les infrastructures de base en Tunisie. Il peut fournir la consommation d'énergie pour ces opérations de construction et de génie civil avec ventilation en 3 catégories:

- (i) Engins de travaux publics;
- (ii) Engins de transport;
- (iii) Usages administratifs locaux.

Le groupe de travail peut préciser les types d'usages finaux qu'il souhaite prendre en considération et établir, en coopération avec le Ministère de l'Equipement, un questionnaire destiné à relever les consommations annuelles d'énergie du Ministère de l'Equipement, avec affectations aux usages finaux ainsi définis.

#### 4.3.5. District de Tunis

Le district de Tunis dispose d'un fichier des établissements commerciaux situés dans le district. Il estime que ce fichier couvre 80 % à 85 % des commerces.

Le groupe de travail pourrait examiner ce fichier en vue d'évaluer son utilisation provisoire avant d'utiliser les résultats du recensement des établissements commerciaux qui sera terminé par l'INS à la fin de l'année 1981.

#### 4.3.6. STEG

La Société Tunisienne d'Electricité et du Gaz (STEG) dispose de données statistiques considérables relatives notamment aux ménages, commerces, et institutions. Elle dispose, en outre, d'un "code d'usage et du gaz" qui pourra être pris en considération par le groupe de travail. Pour obtenir les affectations de ces consommations aux usages finaux, une enquête par sondage pourrait être envisagée par la STEG en coopération avec le groupe de travail.

#### 4.4 DATA ASSESSMENT FOR THE RESIDENTIAL SECTOR

Residential sector data collection for the country as a whole is centralized in INS.

That ministry conducted, for our purposes, two sample surveys of interest in 1980. The first (sample size 60,000) was a survey of population and employment. Two of the modules concerned (1) the economically inactive population and (2) household/housing data. The second (a subsample of 6,000 households) was a detailed consumption/expenditure survey. Taken together, the file for those surveys can provide the following information that has been defined as necessary for energy planning purposes:

- . Size of household
- . Occupation of wage earners
- . Dwelling type (within one of 4 general categories)
- . Construction material of dwelling
- . Energy expenditures as a percentage of total household expenditures
- . Total energy expenditures by type of fuel: electricity, town gas, LPG, kerosene, wood, charcoal (needs to be verified)
- . Fuel used for cooking (indication only)
- . Fuel used for lighting (indication only)
- . Whether wood is gathered by rural women
- . Presence, in household, of certain end use devices (television, refrigerator, cooker, washing machine)

While these data are clearly valuable, it is equally important to consider the type of information that the 1980 INS surveys will not provide. The important information not provided by the surveys is:

- . Type of fuel used for heating/cooking
- . End use allocation of fuels within households

- . Utilization of non-commercial fuels other than wood and charcoal
- . Type of end use devices (in order to gauge efficiency)
- . Pattern of usage of end use devices
- . Age of dwelling
- . Seasonal variation in energy consumption

It is acknowledged that not all of the above data deficiencies will be easily obtained through a new survey. However, end use allocation has been identified as an issue of extreme concern and this represents an area where the existing INS surveys will be of only minimal assistance. (The obvious exception to this is when there is a one-to-one correspondence between fuel types and end uses, i.e., electricity is used only for lighting, LPG is used only for heating, wood is used only for cooking, etc.) Likewise, the working group has noted the importance of accurate data concerning non commercial fuel usage and this topic was also beyond the scope of the 1980 INS surveys.

## 5. DATA TO BE COLLECTED

### 5.1 General Introduction

With the data requirements of the present study defined (Section 3) and the currently existing data evaluated (Section 4), attention may now be focused on the data to be collected. Determining the data to be collected is obviously more involved than merely subtracting Section 4 from Section 3. The data must be physically present in the same file and must refer to the same study population in order to be usable. This means that if household energy consumption data are available in one place (STEG for example) and household demographic data in another place (INS for example), the data cannot be used unless:

1. a procedure is found to merge the data files, and
2. the energy consumption and demographic data are for the same household.

### 5.2 Commercial/Institutional Section

Time constraints kept the full working group from visiting representatives of all of the eleven commercial/institutional subsectors. However, for the subsectors examined during the planning visit, it was determined that comprehensive data collection activities are necessary. The precise methods for carrying out data collection are discussed in Sections 6 and 7.

### 5.3 Residential Section

While there is an abundance of interesting and relevant household data in Tunisia, those data, in their current form, cannot be used to satisfy the demands of the present study.

## 6. DATA COLLECTION STRATEGIES

### 6.1 Overview on the Need for Data Collection Options

The working group recognized the importance of presenting its conclusions in terms of expensive and time-consuming operations, involving a considerable commitment of manpower and other resources. At the same time, usable data may be the product of methods and procedures less complex and costly than field surveys. If data requirements can be fulfilled through forms easily completed by, for example, school superintendents, hospital administrators, hotel managers, etc., then that course should be followed. Likewise, if the requirements can be met through a limited case study approach rather than a full field survey, that course should be adopted. The sector or subsector data collection strategy decided upon should be the least costly that still provides the required data within an acceptable degree of reliability.

### 6.2 Data Collection Problems

The discussion in Section 5 points to the need for initiating data collection activities in the residential and commercial/institutional sectors. A necessary activity between drafting a model questionnaire and implementing a survey is to determine the ease with which the data can be collected. This is a function of the "pilot survey," (see Annex 21), but some variables can be determined as problematic during this initial planning stage. For example, the working group has recognized that household income data may be difficult to collect in Tunisia. The working group, therefore, should now begin developing alternative methods of obtaining these data within the

context of the draft questionnaire. These alternatives can be tested in the pilot survey and the best question or series of questions then used for the full survey of the residential sector.

Another data collection problem, and one that will affect all sectors, is determining end use allocation. End use allocation refers to the proportion of a fuel type used for a specific purpose (e.g., lighting). End use allocation can be obtained, or at least estimated, in two ways:

1. by direct measurement
2. by determining the types of end use devices and their pattern of use and the imputing allocation.

Direct measurement and observation may be the best method of allocating end use for non-commercial fuels. Likewise, as mentioned on page , direct measurement can be used if there is a one-to-two correspondence between fuel types and end uses. In most cases, however, end use allocation will have to be imputed based upon types of devices and patterns of use. The issue of end use allocation is of pressing importance. Practically all data collection activities depend upon developing a method of estimating this, and research into the problem of end use allocation should begin immediately, both in Tunisia and in the U.S.

Another data collection problem is measuring seasonal variation in energy consumption. This problem is particularly important in the "space heating" end use category of the residential sector. There are two methods by which this issue can be resolved. First, any large scale data collection activity

in the residential sector can be scheduled to occur in an "average" month. The second option is to use existing STEG records to draw some conclusions about seasonal variation across sectors, end use categories and (potentially) fuel types.

The STEG metering system is such that electricity consumption (gas consumption in Tunisia) for space heating can be distinguished from electricity consumption for water heating and further distinguished from consumption for other end use categories. That is, existing STEG data can provide information on:

1. electricity/gas consumed for space heating
2. electricity consumed for water heating
3. electricity consumed for all other end use categories (lighting, appliances, etc.)

These data can be used to determine, for region and season, the variation in consumption. Operationally, STEG would select, by region, a sample of households and obtain a printout of their monthly (or seasonal) consumption by end use category for a one year period. The table would ideally look like the following table that contains sample entries for illustrative purposes.

Monthly Electricity Consumption, Beja Region\*

Month \ % of Annual Consumption	Space Heating	Water Heating	Other Uses
January	16	8.5	9
February	16	8.5	9
March	10	8.5	8
April	10	8.5	8
May	6	8.5	8
June	--	8.5	8
July	--	8.5	8
August	--	8.5	8
September	6	8.5	8
October	10	8.5	8
November	10	8.5	9
December	16	8.5	9
TOTAL	100%	100%	100%

The table tells us not only that seasonal variations occur in some end use categories (an obvious assumption) but, more importantly, provide a practical guide to the magnitude of seasonal variations. A household survey conducted in January, for example, would tell us that the space heating consumption for that month is approximately 16 percent of the annual total.

A table such as the one above is useful for at least three other reasons:

1. It will indicate end use categories which are not subject to much seasonal variations;
2. It can also be produced, for example, for small commercial establishments in Kairuon. That is, it is not sector specific;

---

\*obviously the region would be clearly defined.

3. Finally, and perhaps most importantly, the table may be used to make some assumptions about the seasonal variations in consumption of fuels other than electricity and piped gas. That is, rather than carry out the survey in an "average" month or visit the same households in different seasons, the decision may be reached to assume that the basic electricity/ piped gas seasonal consumption is roughly the same for other fuels. This means, returning to the table for an example, that a January wood consumption of 50 kilograms for heating would be assumed to be about 16 percent of the total annual wood consumption for heating.

Irrespective of how the problem of measurement of seasonal variation is to be handled, the fact remains that it is an issue of great importance and should be addressed immediately by the working group.

The data collection problems discussed above are part of a larger area generally referred to as "nonsampling errors." Nonsampling errors can be traced to practically any survey operation, poorly worded questions, a high noninterview rate, interviewer mistakes in the field, processing errors, etc. A combination of good field and office procedures, sufficient training, a thorough quality control program and a well-designed (and tested) questionnaire can keep nonsampling errors and the resulting bias to a minimum. However, the one area over which survey designers have no control is respondents and their willingness and ability to answer questions. Whether designing a questionnaire for hospitals, groceries or households, the respondents' ability and willingness to answer the questions must always be considered.

### 6.3 Commercial/Institutional Sector Recommendations for Adoption

During the planning visit, representatives of several commercial/institutional subsectors were consulted regarding data collection in their areas. (The remaining commercial/institutional subsectors still must be researched by the working group). The four subsectors for which the most information is available are:

1. Tourism
2. Health
3. Education (primary and secondary)
4. Commercial establishments

#### 6.3.1 Tourism Subsector

The tourism subsector consists of the 278 hotels in Tunisia, according to an official classification scheme. Most of the data requirements for this subsector may probably be met by means of a self-administered questionnaire to be completed by hotel managers and coordinated through the office of tourism. This questionnaire can either be distributed to all hotels or to a sample of hotels (stratified by region and size for example). In addition, end use allocation will have to be determined through on-site measurement or derived from end use services and patterns of use.

The tourism subsector survey should attempt to collect energy consumption data on at least the following end-uses:

- |                  |                                       |
|------------------|---------------------------------------|
| 1. cooking       | 6. laundry (except for water heating) |
| 2. space heating | 7. water cooling                      |
| 3. space cooling | 8. elevators                          |
| 4. water heating | 9. other electrical equipment         |
| 5. lighting      |                                       |

### 6.3.2 Health Subsector

The health subsector is composed of approximately 100 hospitals (divided into three types) and 650 primary health care centers. For the hospitals, detailed administrative records are available in Tunisia that may satisfy all data requirements except end use allocation. These administrative records need to be checked against the subsector data requirements to determine their usefulness. If the data requirements are met, then data collection can be limited to on-site measurement/imputation of end use in a sample of hospitals. If the administrative records do not satisfy the requirements, a questionnaire will need to be developed and circulated to all or a sample of hospitals in addition to determining on-site, end use allocation.

No data currently exists on energy consumption in the primary health care centers, many of which are isolated, not electrified and open only at irregular intervals. A questionnaire and sample can be designed and procedures developed to collect data for the health care centers along the same lines as taken in other subsectors. Another option, given the informal structure of the health centers, is to have the Ministry of Health ask health center personnel if any energy is consumed and, if so, what fuel types, amounts and prices. If it appears that primary health care centers consume a statistically insignificant quantity of energy, then it might be advisable (from a cost-benefit perspective) to ignore the centers.

### 6.3.3 Education (Primary and Secondary) Subsector

The education subsector that has been researched consists of all primary and secondary schools in Tunisia (colleges and universities are a topic for future research by the working group).

The Ministry of Education reported that the only energy consumption in primary schools is electricity for lighting. Existing STEG records, therefore, will provide total consumption by quantity, price, end use and end use allocation for primary schools. Existing records at the Ministry of Education can be consulted for demographic and structure data. The major activities to be carried out for primary schools, then, are:

1. developing a form for bringing together the STEG and Ministry of Education data
2. Deciding whether data will be collected for all 2,600 primary schools or just a sample of the primary schools (stratified by size)

There are 230 secondary schools in Tunisia and detailed expense records for these schools can be found at the Ministry of Education. The data collection options for secondary schools are the same as those suggested for hospitals above.

#### 6.3.4 Commercial Establishments Subsector

While a general definition of the commercial establishment subsector is available (see Section 2.2), a specific classification system of groups within the subsector has not been developed. That is, while it is known, for example, that "restaurants" are part of the subsector, the level of aggregation or disaggregation to produce meaningful data on restaurants is not known. Should restaurants be considered (for sampling, data collection and analysis purposes) as part of a larger "leisure/services" group, should they be considered as a group in and of themselves, or should restaurants be further disaggregated, for example, according to size? Detailed planning, questionnaire development,

sample design and implementation cannot proceed until questions like these are answered for the various groups in the subsector. In order to answer these questions, energy planners must consider the use of the data and the kinds of analytical statements they want to make. Is it sufficient to talk about energy consumption for a large group of establishments called "leisure/services" or are finer distinctions required? Also, further research is required into the classification and aggregation methods used in Tunisia during commercial surveys. INS conducted a census of commercial establishments nationwide between 1975 and 1978, and is scheduled to begin fieldwork on another nationwide commercial census in mid-February, 1981 (fieldwork should be completed in 3-4 months). INS, therefore, may be able to provide the answers to the question of classification/aggregation.

Irrespective of how these questions are answered, there are several conclusions that can be drawn and options presented regarding data collection in the commercial establishment subsector. First, the subsector is quite extensive, and to collect comprehensive data of high quality a large scale survey will be necessary (as opposed to using administration records or a self-administered questionnaire and end use allocation followup). Second, the survey may require several questionnaires if substantively different types of data are needed for department stores, for example, as opposed to coffee shops. Third, sample design and selection will be different for each grouping or "list" produced while answering the classification/aggregation questions. For example, if a representative sample of department stores and restaurants is desired (that is, they are considered to be in different categories within the

subsector), then a sample of fifteen department stores nationwide may be sufficient while a sample of fifteen restaurants nationwide is clearly insufficient.

It is nonetheless possible to present two general data collection options. The first option is to conduct a survey of commercial establishments (however defined/categorized) based upon the 1975 through 1978 census. If the classification/aggregation problem can be quickly resolved, work on the survey can begin in the near future. The second option is to delay data collection in this subsector until the data are available from the 1981 commercial census (probably in late 1981). The second option is probably the more desirable of the two, since it:

1. permits sufficient time to resolve the above mentioned problems and;
2. assures that the list(s) used for sampling purposes will be current and not 3 to 6 years old.

#### 6.3.5 Other Commercial/Institutional Subsectors

Data collection strategies and options for the other subsectors of the commercial/institutional sector will be developed as the working group gathers information on these subsectors.

#### 6.4 Residential Sector Recommendations and Options

Section 4.3 of this report concluded that the residential data currently available are not sufficient to meet all of the objectives of this study. To repeat, the existing data do not provide information on:

- . Type of fuel used for space heating/cooling
- . End use allocation of fuels within households
- . Utilization of non-commercial fuels other than wood and charcoal
- . Types of end use devices
- . Age of dwelling
- . Seasonal variation in energy consumption

Within this context, there are several options for data collection in the residential sector.

First, a questionnaire can be developed to determine most of the above information. This questionnaire would be administered to the 6,000 households (on a subsample thereof) that responded to the 1980 consumption and expenditure survey. In addition, a sample would be chosen for direct measurement or imputation of end use allocation. A problem is that this option assumes that the other data relevant to the study (e.g., household size, energy expenditures, occupation, cooking fuel, etc.) have remained the same, which may not be the case. Also, the INS consumption/expenditure survey involved multiple visits to the household, so respondents may be less than willing to cooperate for another interview. However, this option does offer some small savings in cost since the questionnaire would be shorter and a substantial amount of data are already edited, keyed and computerized (although there may be problems in physically merging the data files).

Another option is to use the 1980 INS mini-census (60,000 household nationwide) as a frame from which to draw a sample. This sample of households would be administered a comprehensive questionnaire rather than one which merely fills the gaps in existing data. A subsample would then be chosen for direct

measurement or imputation of end use allocation. The advantages of this option are that the data file will refer to one point in time, that (presumably) a large number of "new" respondents would be sampled and that data files will not have to be merged. The disadvantage is that this option is more costly since a new sample will have to be drawn and the questionnaire will be larger.

A final major option is to measure or impute end use allocation for all households sampled in either of the first two options. This would be much more costly depending upon the specific procedures developed to determine end use allocation, but the sample coverage for this characteristic would be improved.

Additional options will largely revolve around sample sizes of the main survey and the end use allocation subsample. Obviously, the larger the main sample (and end use allocation subsample), the more reliable the data but the more costly the survey. Clearly, a balance must be struck between cost and reliability.

## 7. SUGGESTED IMPLEMENTATION PLAN

This section of the report suggests an overall implementation plan for consideration by Mr. Kamel Rehiq and Mr. Richard Stevenson. It reflects the consensus of the working group.

### 7.1 Suggested Study Objectives

The recent assessment of energy study data requirements and availability in the commercial/institutional and residential sectors has not led the working group to change its collective mind about the need to collect basic energy consumption data in order to improve the national capacity for basic energy policy analysis and planning. In fact, working group meetings with the various ministries have confirmed the need to develop such information so that energy related policies and programs may gradually be developed in many economic sectors. Thus, the overall objectives of the study remain those that were stated in the introduction (#1).

### 7.2 Overview of Project Strategy

While the overall objectives of the study remain the same, it is necessary to set forth and distinguish the various strategies for collecting the data that will satisfy those objectives. The working group realizes that, as a result of the activities carried out during this second planning visit, an effective program of data collection for the household and commercial/institutional sectors will require the design and development of several different types of sophisticated strategies and methods, whose implementation must be correctly phased over time and supported by adequate organizational, technical, personnel, and financial resources.

The overall strategy of the energy consumption study is to form a resourceful and productive Tuniso-American project working group, under the direction of Mr. Kanel Rehk and Mr. Richard Stevenson, that will undertake to direct and monitor the required data collection activities in the commercial/institutional and household sectors. This will involve project planning and coordination, continuing preliminary data collection and assessment, and the design of pre-survey research projects. It also includes the planning and development of sectoral and sub-sectoral survey questionnaires, the development of multi-purpose training plans, the design and conduct of effective field test(s), survey operations, data processing and completing the final report, including specifying energy policy research and analysis opportunities. All of these activities are expected to take place during an 18-month period.

### 7.3 Scope of Work

#### 7.3.1 Preliminary Assessment of Existing Data

The basic strategy for this component is to develop a plan to complete the initial data assessment phase. This plan should acknowledge the availability of existing information on energy consumption in the two sectors under study.

#### 7.3.2 Preconditions to Data Collection

Throughout this report, issues have been raised that require resolution prior to implementation of data collection activities. The most important of these issues are summarized below.

1. Section 6.3 and 6.4 present data collection options in the residential sector and several of the commercial/institutional subsectors. These options must be reviewed and one chosen prior to continuing with the sector or subsector activities.
2. It is not known if the resources available to the working group are sufficient to permit data collection activities to be undertaken simultaneously in several sectors or subsectors. It, therefore, is suggested that thought be given to prioritizing the sectors for implementation purposes.
3. Inter-sectoral boundary problem definition. In Section 2.5 of this report the working group describes certain residential sectoral boundary problems. These and other similar situations should be assessed by the working group and options developed for final consideration by Mr. Rehk and Mr. Stevenson.
4. End use allocation strategy development. The working group recognizes that a problem of critical, but not insurmountable importance, is that of determining the allocation of end use energy consumption. This problem is discussed in Section 6.2 above. The working group should develop and assess options to resolve this problem. This could be accomplished both in the United States, but obtaining the expert assistance of those who have worked with this problem and in Tunisia, by continuing research efforts on the part of Tunisian members of the working group. A synthesis of the results from both approaches could be developed in the short term.

5. The problem of determining seasonal variation of consumption needs to be resolved, both theoretically and operationally.
6. The specifications for data to be collected for energy policy and planning purposes must be finalized. As stated in Section above, the purpose of this study is to improve the data base for energy policy analysis and planning. Mr. Rehik has stated that the data collected in these studies will be used to develop policies in the areas of energy conservation, renewable energy applications, and pricing. In order to assure that the activities of the working group produce data that may actually be used for these purposes, it would be worthwhile for it to identify the basic analytical techniques and methodologies that energy policy analysts would employ, determine the informational requirements of these methods, and assess the feasibility of developing such information, either through the anticipated surveys or by other means. It is recommended that working group members start this research by asking the relevant questions of Mr. Rehik and Mr. Stevenson.
7. The classification/aggregation problem in the commercial establishments subsector (see Section 6.3.4) must be resolved.
8. Finally, there are several technical but relatively easy-to-resolve issues. For example, it is necessary to develop a comprehensive typology of current housing structures in Tunisia. INS used a four-part typology in its 1980 Enquête Nationale sur la Consommation de Menages. The typology (#1) specified the following choices:

"villa ou niv. villa, maisas arabe, appartement, gourbi ou autres."

The working group should determine if this list is sufficiently broad to accomplish the purposes of the study. Likewise, a precise definition of "household" is necessary in order to define the universe for the residential sector. Also, the feasibility of collecting household income data needs further research, leading to an acceptable method for obtaining these data. In addition, a comprehensive list of household energy equipment and appliances is necessary. The compilation of such a list by the working group would be useful for several reasons. First, the determination of type of end use device may be incorporated into the survey questionnaire. Second, the list might be used to assist in obtaining (from equipment suppliers and fuel suppliers) useful information on energy efficiency of the equipment. However, such an approach may be of only partial usefulness, as only suppliers of new equipment might be able to specify such characteristics. Third, such a list of the range of energy-consuming equipment and appliances might be used for training enumerators to better understand the energy-consuming equipment about which they will be asking questions and receiving answers. Moreover, a list of such equipment/appliances might be the first step in a strategy to determine end use energy consumption patterns. The list might then be expanded to collect information about equipment energy consumption characteristics necessary to determine end use allocation.

### 7.3.3 Implementation of Data Collection

When the issues discussed in the preceding section have been resolved, detailed planning may begin to implement data collection activities in the various sectors and subsectors. It should be recalled from Section 6.1 that the scope of data collection activities may vary considerably. In some cases, nation-wide sample surveys may be necessary, with a full complement of procedural manuals, office/administrative support, etc. In other cases, existing research may be used or questionnaires developed and mailed for self-administration. Irrespective of the precise nature of the activity, there are several features common to data collection in general. The following operations can begin after working group, survey statistician, sampling statistician and data processing agreement on data collection instruments, formats and methodology.

#### 7.3.3.1 Preliminary Operations

The preliminary survey operations described below should occur more or less in the order presented, although there will be some schedule overlap.

1. Estimate resource requirements.

Resource requirements should be determined both with regard to personnel and equipment. For personnel, both the numbers and levels of persons should be stated, for example, one survey director, one assistant survey director, three supervisors, eighteen enumerators, five office clerks, three keypunchers, etc. Equipment includes the range of elements from vehicles and computer time to pens, pencils and clipboards.

2. Draft a budget

### 3. Develop a survey calendar and work plan

The preparation of a calendar of activities is essential. It is a relatively simple process, provided that care is taken to make sure that the activities are arranged in the proper order and that realistic workloads and production rates have been determined for each activity. A useful method of displaying such a calendar is found in Annex . Tasks are listed in order on the left side and time intervals are indicated across the top. The survey work plan should specify areas of responsibility for the completion of a task. It should include scheduled and actual completion dates, person responsible, and comments on the status. An example of a survey work plan is in Annex .

### 4. Pretest the questionnaire

Questionnaires should always be tested prior to their use in a full survey in order to guarantee that they actually collect the required data and can be used in practice as well as theory. If the survey is large, it may be advisable to conduct a pilot survey, in which a number of the materials and procedures can be tested (for example, enumerator's manuals, training procedures, field procedures, etc.).

### 5. Design and select the sample

The complexity of this operation will vary from sector to sector, but the general scope of the task should be known prior to the preparation of the survey calendar.

### 6. Develop supporting manuals and administrative procedures

This task will be as complex or as simple as the nature of the data collection activity. The important point is to keep in mind is that

all persons involved in a survey must be aware of their responsibilities and objectives.

### 7.3.3.2 Data Collection

The following activities are considered to be part of the data collection operations.

#### 1. Recruit and train staff

The necessary background and work experience of survey staff obviously depends upon the position for which they are being considered, but provisions should be made to adequately train all of the survey staff. Training will normally consist of a basic description of the project's goals and then concentrate upon the trainees' specific task.

#### 2. Complete logistics

This operation consists of everything from verifying payment of staff to arranging transport and accommodations. For some studies, "logistics" may be little more than checking that there is stamped, addressed envelopes included with a mail out questionnaire. For other studies, the logistical component may be large. The important point is that all logistical considerations be finalized prior to the beginning of fieldwork.

#### 3. Monitor fieldwork

This refers to guaranteeing that data collection is being carried out in a timely manner and is of acceptable quality. All survey operations should be subjected to quality control procedures, but nowhere is this as important as fieldwork. A follow-up contact to validate initial results should be an integral part of survey monitoring.

### 7.3.3.3 Processing the Data

Data processing refers to everything that happens to the data between the time they are returned from the field until the final tabulations are produced. The components of this task include:

1. hand editing and the coding of nonnumerical responses
2. convert the data on the questionnaires into machine-readable form
3. computer edit the data file
4. produce the desired tabulations

### 7.3.3.4 Analysis and Publication of Results

A key objective of the overall study is to analyze the data collected in the various studies and surveys. Keeping in mind that these data will be used for national energy policy research, analysis and planning efforts, the working group should begin to translate the goal of analysis of the data into practical concepts, categories and information requirements that can be integrated into the study planning process from the beginning. In brief, the working group should attempt to formulate the types of analysis results and formats that will most effectively elucidate the energy conservation, renewable energy applications options, and pricing policy objectives that are of paramount importance in the study. It should then assess the basic policy decision methodologies, such as cost-effectiveness, cost-benefit, and trade-off studies for the information required to perform them. Finally, it should devise a plan to incorporate those data requirements into the surveys and studies. Particular attention should be paid to the design of a data processing system that will produce the desired policy and analytical results.

It is the objective of this task to prepare and obtain approval for a final report covering the full scope of the activities of the overall study. It is suggested that, at the completion of the data analysis phase, the working group draft a final report which explains survey goals, strategy, activity and presents the data collected in each surveys and study, providing also the designated analyses. This report will be submitted by the working group to Mr. Rehik and Mr. Stevenson for their final approval.

It is probable that a series of energy policy research publications may develop from this effort. It is thus recommended that the working group, in cooperation with Mr. Rehik and Mr. Stevenson, determine in advance the desired structure, format, number of pages, number of copies, etc., that may be desired.

#### 7.4 Work Plan and Schedule Options

This section is predicated on the assumption that the general and sector-specific "preconditions" (Section 7.3.2) can be resolved in the next two to three months. If these problems take longer to resolve, the work plans discussed here will be affected accordingly. It is also based on the assumption that project resources are adequate to pursue several different activities simultaneously. Even then, it should be noted that the dates/durations contained herein are tentative and provided only for illustrative purposes.

As was done with other parts of this report, this section will cover the residential sector and four of the commercial/institutional subsectors.

#### 7.4.1 Residential Sector

Regardless of the option chosen in Section 6.4, work can begin immediately upon a draft questionnaire. Given the size and importance of this sector, it is suggested that a "draft - circulate for comments - redraft" strategy be adopted and that production of a final questionnaire to be field tested not be scheduled before May. Since this sector will probably require a large scale nationwide sample survey -- and the accompanying manuals, procedures, operations, etc. -- fieldwork cannot realistically be scheduled to begin until about September 1981. Allowing two months for fieldwork and another four months for data processing (these are very tentative estimates), initial tabulations might be available as early as March 1982.

#### 7.4.2 Commercial/Institutional Sector

##### 7.4.2.1 Education subsector

If all of the required information for secondary schools except end use allocation is available from records in Tunisia, the first phase of data collection (abstracting that information) can begin as soon as a data collection form is developed (a collaborative effort of a survey statistician, data processor, the Ministry of Education and the working group) and a sample designed. This should take no more than two months. The second phase of data collection, determining end use allocation, can begin as soon as acceptable procedures are developed. If the required data are not available in a central location, a questionnaire to fill the gaps must be developed. Actual collection may take somewhat longer then, since procedures and forms will have to be developed for merging data from different sources. Nonetheless, tabulations for secondary schools can be available as early as September or October of 1981.

Measurement of end use allocation is not an impediment to data collection for primary schools. Following the other basic steps outlined above for secondary schools, data could be available for primary schools as early as mid-year, 1981.

#### 7.4.2.2. Health

For hospitals, the secondary school procedures and schedule are applicable. For primary health care centers, inquiries can begin now as to whether or not there is any energy consumption. Based upon the answer to that question, the decision may be made to entirely exclude the centers from consideration. Alternatively, a small-scale survey may be necessary in which case the data may be available by the end of 1981 (if the initial inquiries are begun immediately).

#### 7.4.2.3. Tourism

A model work plan for the tourism subsector would be almost identical to that for secondary schools. Even in the absence of centralized expenditure data and the knowledge that a survey will be necessary, data should be available as early as the end of 1981.

#### 7.4.2.4. Commercial Establishments

This subsector will almost definitely require a large-scale survey, perhaps one with several questionnaires and sampling frames (see section 6.3). If work begins immediately in this subsector (that is, the 1975-78 census is used), results can be expected as early as March, 1982 (see 7.4.1 for procedures in the residential sector to obtain a better understanding of specific operations). If, on the other hand, the 1981 commercial census is used, as a sample frame, and the data from it are available by September, 1981 (the INS. estimate), then data for this subsector will not be available until late 1982 or early 1983.

### 7.4.3. Illustrative Schedule

This schedule is provided in order to show a format for portraying a summary workplan and schedule. It is suggested that once all the necessary decisions have been made and the initial research accomplished, the new workplan and schedule could be displayed as below:

#### ~~8.2~~ EMPLOI DU TEMPS

Les operations listees dans le Programme de Travail peuvent etre entreprises selon l'Emploi du Temps suivant :

OPERATIONS	I 9 8 1					I 9 8 2						
	J	F	M	A	M	J	J	A	S	O	N	D
<b>A. CONCEPT</b>												
I. Constitution Groupe de Travail												
2. Definition des Secteurs												
3. Definition des Sous-Secteurs												
4. Definition des Donnees a collecter												
5. Definition des Programmes de Formation												
6. Adoption du Planning												
<b>B. EXECUTION</b>												
7. Seminaire General												
8. Formation des Recenseurs												
9. Collecte des Donnees												
10. Exploitation des Resultats												
II. Preparation et Publication du Rapport												

On voit qu'il serait possible de proposer les dates objectifs suivantes :

- |   |                              |
|---|------------------------------|
| (a) Finalisation du Concept               | I Juillet 1981               |
| (b) Formation :                           | Juillet-Septembre 1981       |
| (c) Collecte des Donnees                  | I octobre - 30 Decembre 1981 |
| (d) Exploitation des Resultats            | I Janvier -I Avril 1982      |
| (e) Preparation et Publication du Rapport | I Avril-I juillet 1982       |

## 7.5 TRAINING

This section concentrates on the training to be provided to high-and-middle level Tunisian officials in various ministries for whose work it would be useful to develop a basic understanding of various aspects of the overall energy consumption study. This training is not to be confused with the staff training for survey operations that was discussed in 7.3.3.2 (#1) above.

The objective of the energy consumption study seminar would be to familiarize a group of not more than 30 high-and-mid level Tunisian officials with the need for the study; its basic component areas; preliminary study design and development results to date; survey methodologies and operations; the need for inter-ministerial organization and cooperation; the desired results of the overall study; and the possible applications of those results to a variety of energy policy problems in the fields of housing, urban development, agriculture, rural development, among others.

It is recommended that this seminar be held in June, 1981 over a three-day period. It is suggested that the workshop group consider the advisability of holding this seminar and submit its recommendations to Mr. Rehuk and Mr. Stevenson. Upon their approval, it would be the task of the working group to design an overall plan for conducting this seminar and to submit the plan, along with the resources required to the above decision-makers.

In addition to the possibility of the above initial seminar, the working group recognizes that there may be needs for several other types of seminars and workshops over the duration of the project.

## 7.6 PROJECT ORGANIZATION

The success of the design and development of the overall consumption study depends in large part on the organizational structure and functions that are developed to accomplish all the necessary tasks described in the implementation plan. The key element is the Tuniso-American working group.

### 7.6.1. Structure of the Working Group

A working group composed of Tunisian and American specialists has already been formed and has performed its initial duties very well. It is suggested that this working group be formally established and its general structure defined, possibly as follows:

#### Decision Makers

Mr. Rehk, K.  
Mr. R. Stevenson

#### Tunisian Specialists

Mr. M. Rezgui  
Mr. A. Ben Ahmed  
Mr. M. Nouri Ammar  
Mr. A. Ounali  
Mr. N. Hamza  
Others (to be designated)

#### American Specialists

Mr. Chatel (commercial institutional)  
Mr. Tyler (Residential)  
Mr. John Anderson (residential)  
Mr. J. Gibbs (survey)  
Mr. S. Zouten (AID/Science & Technology)  
Others (to be designated)

#### Rapporteurs

Mr. M. Rezgui  
Mr. B. Chatel

### 7.6.2. Notes on the Structure of the Working Group

As the working group performs its functions, it will inevitably perceive the need for varied types of expertise. Before inviting another individual to become a permanent or semi-permanent member of the working group, it is suggested that members consider the following steps:

- 1) Define the needs for additional personnel as precisely as possible. For example, what specific knowledge/skills/resources is required? For what purpose? For how long? The consensus to these questions will help the working group to pinpoint their needs better;
- 2) Identify a range of possible candidates for inclusion in the working group on a permanent, semi-permanent, or occasional basis. Determine their general availability and willingness to carry out the functions within the conditions specified in #1 above;
- 3) Submit the list of candidates, along with working group recommendations to Mr. Rehk and Mr. Stevenson for their final approval.

### 7.6.3. Functions of the Working Group

Each of the members of the group, in addition to this/her participation in the general management of the project, might also be assigned responsibilities for other specific areas of responsibility such as energy economics, energy engineering, energy policy training, survey project design and development, survey operations, sampling methodology and statistics, among others. In addition, members of the group may also be formally assigned responsibilities for accomplishing sectoral and sub-sectoral activities.

The following is an example of such an overall formulation of working group functions, for consideration:

Fonction	Responsables
(1) General	Experts Tunisiens Experts étrangers ( A designer par le Gouv't Tunisien)
Definition du secteur	INS
Planning de l'Enquete	
Definition Generale des donnees a collecter	
Questionnaire general	
Methodes de collecte	
Formation du Personnel	
 (2) Sous-Secteurs	
2.1. Construction	
2.2. Finances	
2.3. Commerces, U	
2.4. Communications	
2.5. Ministeres	
- Education	
- Sante	
- Interieur, Collectivites Locales	
- Mairie et District de Tunis	
2.6. - SNEG et Stes de Petrole	
2.7. ONTT- Tourisme	
2.8. Institutions Culturelles et Religieuses	
2.9. Loisirs	

Pour chacun des sous-secteurs ci-dessus, le Responsable indiquerait :

- La definition du Sous-Secteur,
- Le Planning de l'Enquete dans le Sous-Secteur,
- La definition Sous-Sectorielle des donnees a collecter,
- Le Questionnaire applicable au Sous-Secteur, adapte a partir du Questionnaire General ci-dessus,
- Les methodes de collecte dans le Sous-Secteur,
- La Formation du Personnel de Recensement,

### 7.7. PROJECT MANAGEMENT

It may suffice to state now that overall project management and control responsibilities are under the guidance of Mr. Kamel Rehk. The same responsibilities to the extent that they concern the particular expertise, resources, and participants of U.S. participants in the project, are under Mr. Richard Stevenson. Coordination of the various Tunisian and U.S. resources is a matter for their joint consideration. Should they indicate a need to prescribe a management control system and specify its structure and function, that

## 8.1. Activités en Tunisie

Le groupe de travail après avoir examiné les diverses alternatives et options, a adopté le planning prévisionnel des travaux à effectuer en Tunisie au cours des mois de Février et Mars 1981 (Voir Annexe 22);

	Dates
a) Tourisme: établissement d'un questionnaire	1-22 Février 1981
b) Santé: Etablissement d'un questionnaire pour les:	
-centres de santé de base	1-8 Février
-hôpitaux	1-22 Février
c) Education	
Etablissement d'un questionnaire par:	
- les écoles primaires	1-28 Février
- Les écoles secondaires	23-28 Février
d) Commercial	
Recherches sur la définition du secteur commercial, sur les options de base des données et les modalités et l'enquête	1 Février-15 Mars
e) Menages	
Recherches comme ci-dessus et préparation d'un questionnaire	1 Février-15 Mars
f) Construction et Infrastructure	
Recherches et Questionnaires	23 Février-9 Mars
g) Interaction avec la STEG: Etudes sur le rapprochement des codifications, les données disponibles et leur utilisation, la reprise des données non utilisables, les variations saisonnières et les courbes de charge par usage et catégorie d'usage	2-9 Février 16-23 Février

## 8.2. Activités des Experts Américains

Les experts Américains procéderont aux études suivantes dans la période du 1 Février - 15 Mars 1981.

- (1) Recherches sur la définition et les problèmes des usages finaux;
- (2) Recherches sur les problèmes relatifs aux variations saisonnières de consommation;
- (3) Recherches sur les documents existant concernant les enquêtes de consommation d'énergie et établissement d'une bibliographie;
- (4) Planning de la phase de réalisation

## 8.3. Programme de la prochaine session du Groupe de Travail du 16 Mars au 28 Mars 1981

### (a) Phase de planification

- Revue des activités effectuées pendant la période de classification
- Evaluation préliminaire des données existantes,
- Revue des questionnaires en cours d'élaboration
- Assistance pour la préparation de nouveaux questionnaire
- Revue des problèmes d'usages finaux et de variation saisonnière et élaboration de solutions

### (b) Phase de réalisation

- Planning et conduite des opérations préliminaires;
- Déterminer les ressources nécessaires;
- Préparer le budget
- Développer un programme de travail et calendrier pour la réalisation de l'enquête
- Développement de questionnaires supplémentaires
- Pré-essais des questionnaires
- Elaboration et solution des échantillons

- Développer les manuelles nécessaires pour les enquêteurs
- Développer les procédures administratives

DRAFT

12 May, 1981

Hand Editing and Coding Guidelines:

The Vehicle Inspection Station Questionnaire and Postcard

Hand editing and coding is the process by which questionnaires are cleaned and certain responses are assigned a numerical code prior to keypunching. In operational terms, editing and coding refers primarily to reading through the questionnaires and translating "word" answers into numbers in order to facilitate computer processing of the data.

The development of editing and coding guidelines (and lists of codes to be used by office personnel) is a very straightforward task, but often requires consulting outside sources to determine appropriate codes.

There is a considerable amount of hand editing and coding necessary on the Vehicle Inspection Station Questionnaire and Postcard, and the following is a question-by-question description of editing and coding specifications (and/or the procedures that should be followed to develop lists of acceptable codes). It is suggested that editors/coders use red pen or pencil to make entries in the questionnaires so that their notations can be distinguished from those made by the interviewers.

VEHICLE INSPECTION STATION QUESTIONNAIRE

Control Number and Date

There must be a 6-digit control number on the questionnaire. If it is missing, the Automobile Listing Sheet should be consulted. The vehicle make and type from the Listing Sheet can be compared to question 16 and 17 and the last three digits of the control number thereby determined.

The first digit of the control number indicates interviewing location:

- 1 = Tunis
- 2 = Sousse
- 3 = Sfax
- 4 = Beja

The second and third digits of the control number are the interviewers identification number and are - analytically - unimportant. That is, cells 2 and 3 can be coded with "9's" if they are missing.

Cells 8 - 13 are for the date of the interview. If the date is missing, it can be entered as follows:

- 11 May - Sousse
- 12 May - Sfax
- 14 May - Beja
- 9, 16 and 18 May - Tunis (the Automobile Listing

Sheet should be consulted to determine which of the 3 days the interview occurred).

Question 1 : Name

The respondent's last and first name should be entered with a space separating the names. There can be no more than one letter per cell. If it is a short name, empty cells should be left blank. If it is a long name, excess letters should be recorded beneath the cells (although they will not be keypunched).

Question 2 : Address

The editing and coding instructions for question 1 also apply to question 2.

Question 3 : Telephone Number

There should be no more than one number per cell. If the respondent does not have a telephone, "9" should be entered in the cells.

Question 4 : Profession

The INS Codebook, in which professions are assigned a 4-digit code, should be used for this question. Missing responses should be coded "9999".

Question 5 : Fuel Level

The fuel gauge is divided into eighths and the office coding boxes appear to the right of the gauge. Office coders will be responsible for marking ("X") in the code box that corresponds to the fuel gauge reading indicated by the enumerators. If the answer is missing, or the fuel gauge does not work, center a "9" just to the right of the cell-number box.

EXAMPLE:

If gauge is marked



The coder should mark

Full	8	<input type="checkbox"/>
	7	<input checked="" type="checkbox"/>
	6	<input type="checkbox"/>
	5	<input type="checkbox"/>
	4	<input type="checkbox"/>
	3	<input type="checkbox"/>
	2	<input type="checkbox"/>
	1	<input type="checkbox"/>
Empty	0	<input type="checkbox"/>

Question 6 : Type of Fuel Used

Check that one of the fuel types is checked. If the answer is missing, enter a "9" just to the right of the cell-number box.

Question 7: Odometer Reading

There should be no more than one number per cell. Check that the number is zero-filled and right-justified. That is, "18,150" should appear as 0018150. In some cases, a number appears in the boxes along with a notation such as "this is the third time the odometer has turned over". When this type of note appears, the coder must be careful to add 100,000 kilometers for each time the odometer has turned over. For example, if the odometer reads 63,000 km., but it is currently on the third cycle, the correct reading is really 263,000 km.. Missing answers should be coded with "9's".

Question 8 and 8 a : Number of Engines

Question 8 a should be consistent with question 8. That is, 8 a should be blank if 8 is "yes" and 8 a should have a number entered if 8 is "no". If these conditions are false (e.g., 8 a is coded "2" and 8 is "yes", or 8 a is blank while 8 is "no") the answer to question 8 should be changed. Consistency should be forced by changing the answer to question 8 such that it is consistent with question 8 a (this also applies if 8 a contains an entry and 8 is blank). If both questions are blank, "9's" should be coded. If 8 a is correctly (8 is "yes"), then leave cell 8 a blank.

Question 9 : Maintenance Guidelines

Either the "yes" or "no" box should be checked. If the answer is missing, enter a "9" just to the right of the cell-number box.

Question 10 a : Date of Last Service

There should be no more than one number per cell. If the date or month is missing, "9" should be entered in the cells. A "don't know" or "never serviced" response should be coded "999999".

Question 10 b: What Was Done At The Time Of The Last Service

All of the items (cells 88 - 93) should be coded either "yes" or "no". Any missing answer should have a "9" entered just to the right of the cell-number box. The fourth and fifth item ("tune-up" and "adjust carburetor") are not applicable for diesel cars and should be left blank.

In addition, code lists need to be developed for persons who have "other" work done on their vehicles. This work will be described on the "specify" line. Typical services for which there are no precodes (e.g., adjusted brakes) should be assigned codes 3 - 8 and the appropriate code then entered in cell 93.

Question 11 : Brand Name and Viscosity of Motor Oil

Code lists need to be developed for the brand names and SAE weights of Tunisian motor oil. This information can probably be obtained from service stations, fuel distributors, and retail outlets. Several sources should be consulted in order to guarantee that the lists are complete. The assumption is made that there probably are more than ten brand names (cells 94 - 95) but probably not more than eight or nine SAE weights (cell 96). Also, a SAE equivalent for a type of oil, such as "Shell - Super", should be determined. Missing answers should be coded with "9's".

Questions 12 and 13 : Frequency of Checking Tire Pressure and Wheel Balance/Alignment

One answer only should be checked. If the answer is missing, enter a "9" just to the right of the cell-number box

Questions 14 and 15 : Vehicle Registration Certificate Number and Chassis Number

Eight cells are provided for coding these answers, which are a combination of numbers and letters obtained from the "carte gris". When coding, these figures should be left-justified and any extra cells left blank. Missing answers should have "9" entered in all the cells (the registration number also appears on the Automobile Listing Sheet, so it should be checked before coding cells 8 - 15 with "9").

Question 16 : Vehicle Make

A code list needs to be developed of all vehicle makers present in Tunisia.

The list should be alphabetized, for example:

O1 = Austin  
O2 = BMW  
O3 = Citroen  
O4 = etc.

Code 90 should be used for "other" makes and 99 for missing answers (before coding 99, the Automobile Listing Sheet should be checked as the vehicle make should have been recorded there also).

Question 17 : Vehicle Type

Code lists need to be developed for this question, much as was done for question 15. An important difference is that each vehicle make (question 15) will need a separate code list for question 17 that is specific to that vehicle make. Ten cells are provided in the questionnaire for coding this answer, although probably no more than two are necessary. Missing answers should be coded "99" after the Automobile Listing Sheet is checked to see if the vehicle type appears there.

Question 18: Date of First Registration

The last two digits of the year should be entered in cells 36 - 37. Missing answers should be coded "99" but, again, the Automobile Listing Sheet should be checked before coding "99".

Question 19 : When Respondent Obtained Vehicle

As with question 15, the last two digits of the year should be entered in the appropriate cells and missing answers coded "99".

Questions 20 a and 20 b : Did The Vehicle Pass Inspection and (if not) Why Did It Fail?

As with questions 8 and 8 a, consistency should be forced by mandating that the answer to question 20 a is consistent with question 20 b.

That is, if 20 b is blank, then 20 a must be "yes" and vice versa.

If both questions are blank, question 20 a should be coded "9" and 20 b left blank. However, before this is done, the Automobile Listing Sheet should be checked. At some interviewing sites the pass/fail information was recorded on the Automobile Listing Sheet.

Also, a code list must be developed containing possible reasons that a vehicle may have failed inspection (question 20 b). The initial code list for this should be fairly detailed as separate reasons can always be combined for tabulation and analysis.

Question 21 : Air Pressure In Tires

Air pressure was recorded in kg./cm<sup>3</sup>. Missing responses should be coded "99".

It should be noted that pressure was not measured for every automobile in the pilot survey. It was measured for all automobiles interviewed in Sfax and Beja. In Sousse it was taken for vehicles numbered 017 - 042, and in Tunis for vehicles having "12" as the first two digits in the control number.

Question 22 : Tire Size

A code list needs to be developed corresponding to automobile tire sizes. It is recommended that code "98" be reserved for automobiles having more than one size tire. Missing answers should be coded "99".

Questions 23 and 24 : Type Of Tire And Presence Of Air Conditioners

Either "1" or "2" should be checked and missing answers should have a "9" entered just to the right of the cell-number box.

Questions 25 and 26 : Horsepower and Engine Size

The Ministry of Transportation said that horsepower and engine size could be determined from a manual in their office if an automobile's make, type, and chassis number were known. Missing answers should have "9" entered in the appropriate cells.

POSTCARD

Control Number

The Control Number is the link between the Vehicle Inspection Station Questionnaire and the Postcards. It must be present in order to link the data on the two forms. The only instances in which there may be problems are the questionnaires administered (and postcards distributed) the first day of interviewing in Tunis. These questionnaires have "10" as the first two digits of their control number, and there is a strong possibility that the control numbers were not transferred to the postcard prior being given to respondents. For these cases (no more than 11), the automobile chassis number (item 9 on the postcard and question 15 in the questionnaire) should be used to link the forms.

Item 1 : Date

The numbers in the date should be zero-filled and right-justified and should be in "day, month, year" order. Missing answers should be coded with "9's".

Item 2 : Quantity of Fuel Purchased

The number of liters purchased should be transcribed to cells 13 - 15. This figure should be zero-filled and right-justified. An independent coding system must be developed for LPG-powered vehicles, and code "999" used for missing answers.

Item 3 : Type of Fuel Purchased

The same codes should be used as for question 6, that is:

- 1 = Gasoline - Super
- 2 = Gasoline - Regular
- 3 = Diesel
- 4 = LPG

Missing answers can be coded from the vehicle Inspection Station Questionnaire.

Item 4 : Cost of Fuel

The Dinars and Millimes paid for the fuel should be transferred to cells 17 - 21. The answers should be zero-filled and right-justified with "9's" indicating a missing response.

Item 5 : Odometer Reading at Time of Purchase

This figure should be transcribed to cells 22- 27, being careful to zero-fill and right-justify. Missing answers should be coded with "9's". (Note that missing answers may later be imputed using "amount purchased" and average vehicle efficiency as calculated from other postcards for the vehicle. Also note that this answer should be consistent with the odometer reading recorded at the inspection station. That is, there cannot be fewer kilometers than recorded in the Inspection Station Questionnaire and the postcard should reflect the fact that the odometer may be on its second or third cycle).

Item 6 : Fill Tank?

"1" or "2" should be transcribed to cell 29, or a "9" entered if the answer is missing.

Item 7 : Vehicle Use

Coders should use the numbers 0,1,2,3, and 4 in cells 29 - 31 to indicate the vehicle's use since the last fuel purchase. The cells should have "9" entered if the question is completely blank. Note that rules need to be developed to deal consistently with postcards where the use either adds up to more than or less than "All". (Documentation should be maintained, indicating the frequency of problems in coding this item.)

Item 8 : Fuel Gauge Reading

A number 0 - 8 should be entered in cells 32 and 33, reflecting the before and after-tanking fuel gauge readings. Code "9" will be used for missing answers and vehicles without working gauges.

Item 9 : Chassis Numbers

The vehicle chassis number should be transcribed to cells 34 - 41. This figure should be left-justified and excess cells left blank. Missing answers can be obtained from question 15 of the Vehicle Inspection Station Questionnaire (with "9's" used only if the information is missing on both forms).

D R A F T

19 May, 1981

COMPUTER EDITING SPECIFICATIONS

The purposes of computer editing are to verify previous manual processing operations, to guarantee that the data fall within a certain pre-specified range of acceptable responses and to ensure that data are consistent internally and between the questionnaire and the postcards. Errors discovered during the computer edit will require hand correction, so close collaboration is required between system analysts, programmers, subject matter experts, and statisticians.

Two stages of computer editing are recommended. The first is a range edit which basically checks the "reasonableness" of questionnaire/postcard responses. Errors detected during this edit are generally the result of keypunching or coding mistakes and, for the most part, can be easily resolved by consulting the questionnaire/postcard in question. For example, a range edit error would be a car with a reported year of first registration of "1911". Range edit specifications for the Vehicle Inspection Station Questionnaire and Postcard are found in Appendix A.

The second edit is a consistency edit in which a series of pre-determined variable relationships are tested. The relationships are both internal to a questionnaire/postcard and between a questionnaire and postcard. The consistency edit, for example, would detect errors such as a 20-year old car with only 5,000 km. on the odometer. Development of the consistency edit is generally a collaborative effort among system analysts, programmers, survey statisticians, and subject matter experts. Appendix B is a first draft of the narrative consistency edit specifications. The narrative specifications cannot be programmed in their draft form, but rather present a point of departure for further discussions of the specific inter-variable/record checks that are considered relevant and important.

62

Appendix A : Range Edit SpecificationsInspection Station Questionnaire

<u>Question</u>	<u>Cell #</u>	<u>Valid Value</u>
Control Number	1 - 7	Specified Legal Value (i.e., must be one of the control numbers assigned during interviewing)
Date	8 -13	8-9=09,11,12,14,16 or 18 ; 10-13=0581
1 - Name	14-33	Any letter A-Z
2 - Address	34-58	34-37=Numbers or letters : 38-58=Letters
3 - Telephone #	59-65	At least six numbers or all "9's"
4 - Occupation	67-70	Specified legal value based on INS coding system
5 - Fuel Gauge Reading	71	0 - 9
6 - Type of Fuel Used	72	1-4 or 9
7 - Odometer Reading	73-78	001000-275,000 (cases outside this range may not be errors, but the questionnaire should probably be checked to see if it is obvious keypunch error)
8 - Original Engine	79	1,2 or 9
8a - Number of Engines	80	blank (i.e., correctly skipped) 2-4 or 9 (as with question 7, questionnaires with cutliers should be reviewed)
9 - Maintenance Guidelines	81	1,2 or 9
10a - Date of Last Service	82-87	82-83=01 thru 31 or 99 ; 84-85=01 thru 12 or 99; 86-87=78 thru 81 or 99
10b - Things done when last serviced	88-93	88-90=1,2 or 9 ; 91-92=1,2,9 or blank ; 93=1-9 (codes 3-8 for cell 93 will have to be developed based upon a review of the "other specify" cases).

Question	Cell #	Valid Value
11 - Motor Oil	94-96	94-95=01 to nn or 99 (the "nn" is the number of codes assigned during coding) 96=1-9
12 - Check Air Pressure	97	1-3 or 9
13 - Balance & Alignment	98	1-3 or 9
14 - Registration Number	8-15 (record 2)	Combination of 2 to 3 letters and 4-6 numbers
15 - Chassis Number	16-23	
16 - Vehicle Make	24-25	01-nn or 99 ("nn" explanation same as for Q.11)
17 - Vehicle Type	26-35	26-27=01-nn or 99 ("nn" same as above) 28-35=blank
18 - Date of First Registration	36-37	49-81 or 99 (the questionnaire should be reviewed for registration dates prior to 1949 to see if "49" is reasonable)
19 - Respondent owned Vehicle	38-39	49-81 or 99
20a - Pass Inspection	40	1,2 or 9
20b - Reasons Failed	41-50	41-42, 43-44, 45-46, 47-48, 49-50=01-nn ("nn" same as for question 11)
21 - Pressure in Tires	51-58	51-52, 53-54, 55-56, 57-58=0.5-3.5 or 9.9 (again, the edit will reject outlier cases that are likely to be keypunch or coding errors)
22 - Size of Tires	59-60	01-nn or 99 ("nn" same as question 11)
23 - Type of Tire	61	1,2 or 9
24 - Air Conditioning	62	1,2 or 9
25 - Horsepower	63-65	040-400 or 999 (outliers should have the questionnaire reviewed for coding or keypunch errors)
26 - Size of Engine	66-69	0300-5000 or 9999 (outliers again to have the questionnaire reviewed)

POSTCARD

Item	Cell #	Valid Value
Control Number	1 - 6	Specified legal value (as for questionnaire control number)
1 - Date	7 -12	78=01-31 or 99 : 9-10=01-07 or 99 : 11-12=01 or 99
2 - Quantity Purchased	13- 15	005-125 or 999 (again, the edit will reject outliers for hand review)
3 - Type Purchased	16	1-4 or 9
4 - Cost of Fuel	17-21	01000-2'000 or 99999 (outliers should be reviewed)
5 - Odometer Reading	22-27	001000-275000 (outliers should be reviewed)
6 - Fill Tank	28	1,2 or 9
7 - Use	29-31	29,30 and 31=0-4 or 9
8 - Gauge Reading	32-33	32 and 33=0-9
9 - Chassis Number	34-41	

## APPENDIX B

## CONSISTENCY EDIT SPECIFICATIONS

There are four parts to the consistency edit:

- The internal checks in the Inspection Station Questionnaire
- The internal checks in the Postcard
- The checks between the questionnaire and postcard
- The checks between postcards

As mentioned earlier, the consistency edit is designed to test predetermined variable relationships. These relationships are of two basic types: those that are more or less self-evident and not subject to modification and those that are more subtle - usually involving an algorithm - and subject to revision as cases are edited and problems arise. An example of the first type of relationship can be taken from Item 8 on the Postcard where respondents are to mark the fuel gauge reading before and after buying fuel. The edit for this relationship can be simply stated "the value of cell 35 (after tanking) must be greater than or equal to the value of cell 32 (before tanking)." This relationship will not change during the course of editing.

An example of the second type of relationship could be the expected relationship between age of the vehicle and odometer reading. That is, the fact that newer vehicles probably have fewer kilometers than older vehicles. This relationship could be posited in a series of statements such as "If Q. 18 (year of first registration) is 1980, then Q. 7 (odometer reading) must be 5,000 - 30,000." What this statement will do is detect cases of 1980 vehicles with less than 5,000 or more than 30,000 kilometers. These cases obviously may not be errors, but nevertheless, the questionnaire should be consulted (to verify keypunching) and eventually the statement may be revised if too many cases are being rejected that are not, in fact, errors.

Inspection Station Questionnaire

1. If cell 72 (type of fuel) is "3" (diesel), then cells 91 and 92 ("tune up" and carburetor adjustment) must be blank.
2. If cell 72 (type of fuel) is "4" (LPG), the cell 71 (fuel gauge) must be blank.
3. If cell 79 (original engine) is "1", cell 30 (total number of engines) must be blank.
4. Cells 24-25, record 2 (vehicle make) must be consistent with cells 26-27 (vehicle type) for that vehicle make, for example, there cannot be a "Peugeot 520:".
5. Cells 38-39 (year current owner acquired vehicle) must have a value greater than or equal to cells 35-37 (year of first registration).
6. If cell 40 (pass/fail) is "1" (pass) then cells 41-50 (reason for failing) must be blank.
7. A consistency check must be developed that compares question 18 (year of the vehicle) to question 7 (odometer reading).
8. Questions 25 and 26 (horsepower and size of engine) must be consistent with question 16 and 17 (vehicle make and type).

POSTCARD

1. Item 2 (liter purchased) must be consistent with item 4 (Dinars paid).
2. If cell 28 (was tank filled?) is "1" (yes), then cell 33 (fuel gauge reading after tanking) must be "8" or "9" (tank was filled or missing answer).
3. If cell 23 is "2" (no), then cell 33 cannot be "8".
4. The sum of cells 29,30 and 31 (vehicle use) must be either "4" or "27".
5. The value of cell 33 (fuel level after tanking) must be greater than or equal to the value of cell 32 (fuel level before tanking).

Questionnaire - Postcard Checks

1. The postcard date can be equal to or later than the questionnaire date.
2. Type of fuel purchased (gasoline, diesel, or LPG) must be the same on the postcard as in the questionnaire, although for gasoline, changing from regular to super and vice versa is acceptable.
3. Kilometer reading on the postcard must be greater than kilometer reading in the questionnaire (if they are equal, the postcard and questionnaire will be checked by hand).

POSTCARD - Postcard Checks

1. The date must be later and the odometer reading greater across the series of postcards. That is, the second postcard must have a later date of purchase and reflect a higher odometer reading than the first postcard (obviously if both conditions are false, i.e., the date and odometer reading are in error, the postcards were not received in the correct sequence).
2. The type of fuel purchased (gasoline, diesel, or LPG) must be the same on all the postcards although changes between regular and super gasoline and vice versa are acceptable.

Recd. 16 JUNE 81

19 May, 1981

Follow-up and Evaluation Tasks: Transportation Pilot Survey

1. Some respondents will undoubtedly fail to return their postcards, thereby necessitating recontact. At least one postcard should have been returned by each respondent by about June 3, which is three weeks after interviewing was done outside of Tunis and over two weeks after interviewing was completed in Tunis. The Inspection Station Questionnaire can be used to generate a name, address, and telephone number listing of non-respondents. Recontact can be by mail, telephone, or in person, but the important point is that non-respondents be contacted promptly. Recontact will also be necessary if several weeks pass between, for example, the second and third postcard from a specific respondent.

2. There are several outstanding issues from the Gibbs/Rose memo of April 3, 1980. Specifically:

- How many vehicles were inspected per month at each of the Inspection Stations in 1980.
- What are the specific vehicle classes that are inspected at the stations. That is, it was apparent that private cars, société cars, taxis, louages, cammionettes, and some trucks went through the stations. What type of vehicles don't go through the Inspection Stations (for example, trucks above a certain size)?

3. Careful records must be kept of incoming postcards. A system is probably required in which all postcards are logged in (along with their date of receipt) by control number. For example:

Control Number	1	2	3	4	5
101016	21/5	30/5			

4. The consistency editing specifications need to be finalized and put in a "programmable" form. This will require close collaboration between CNI, the Task Force and the Ferguson - Bryan coordinator.

5. Work should begin immediately on developing the code lists (see the editing and coding specifications for a list of questions requiring office coding).

6. Question 20b concerns the reasons a vehicle may have failed inspection. If the only reason for failure is having the license plate number in the wrong format, the answer to question 20a should probably be changed to "pass".

7. Work should begin immediately on developing a tabulation plan for pilot survey data. This is a function of the task force, Ferguson - Bryan coordinator, and CNI systems analysts/programmers. Naturally, an element of the tabulation plan is evaluating the effectiveness of specific pilot survey questions. For example, there is a general feeling that the question on air-conditioning should be dropped for the full survey. A frequency distribution of "yes/no" responses to that question should be produced in order to confirm the general supposition that air-conditioning is practically non-existent.

8. Having seen roughly 160 questionnaires administered over the past week and a half, everyone involved in the pilot survey has fairly firm ideas about ways in which the questionnaire can be improved. These ideas should be put on paper while they are still fresh in people's minds. Right now, the areas of possible improvement center on the questionnaire and listing procedure. However, over the next several weeks improvements to the post-card, the "processability" of the forms, the hand-editing and coding guidelines, the computer editing specifications, etc. will become evident. It is important that suggested changes be documented.

7/11

9. By late June, a decision should be made regarding the timing and location of formal pilot survey evaluation/modification meetings. By this, I mean an opportunity for Ben Ahmed, Gibbs, Rose, Ounali, and Rezgui to evaluate the pilot survey data, procedures, etc. and to make the revisions necessary prior to fielding the survey throughout the country. The logical time for this activity would be in July or August and, per Ben Ahmed's suggestion, it may be more practical for Task Force members to come to Washington to work than for the Americans to come to Tunisia.



5 - Le moteur actuel est-il celui d'origine ?

1  oui (continuer à 9)  2

2  non 8a. Combien de moteurs a eu le véhicule y inclus le moteur actuel ?

8.1  moteurs

9 - Les recommandations du constructeur figurant sur le manuel d'entretien sont-elles généralement suivies ?

9.1  oui  
2  non

10a- Quelle est la date du dernier entretien de votre véhicule ?

82  87

10b- Qu'avez-vous fait au cours de cet entretien ?

vidange d'huile 1  oui  
2  non  29

changement de filtre à huile 1  oui  
2  non  57

graissage 1  oui  
2  non  30

mise au point allumage moteur 1  oui  
2  non  23

réglage carburateur 1   
2   22

autres (spécifier) ----- 1  oui  
2  non  93

75



20b - Pourquoi la visite n'a pas été réussie ? (citer les raisons).

- 1 - ----- 41-42
- 2 - ----- 43-44
- 3 - ----- 45-46
- 4 - ----- 47-48
- 5 - ----- 49-50

21 - Indiquer la pression d'air dans chaque pneu.

- AG 51-52  AD 55-56   
ARG 53-54  ARD 57-58

22 - Dimension des pneus ----- 59-60

23 - Type des pneus.

- 1 -  radial
- 2 -  à plis

24 - Le véhicule dispose-t-il d'un climatiseur ?

- 1  oui
- 2  non

Case réservée à l'Administration	
25	Puissance réelle en CV 63-65 <input type="checkbox"/>
26	Cylindrée 66-69 <input type="checkbox"/>

بطاقة بريدية  
Carte Postale

رقم المراقبة  
numero de contrôle

1-6

خاص بالادارة  
servé à l'Administratif

التاريخ  
Date

7-18

45.15

كمية الوقود المشتراة  
Quantité de carburant acheté

لترات  
Litres

46

نوع الوقود  
Nature du carburant acheté

17-21

ثمن الوقود  
Montant total payé

دينار  
Dinars

22.27

رقم عداد المسافة عند اشتراء الوقود  
Indication du compteur à l'achat du carburant

كم  
Km

25

هل ملأت الخزان؟  
avez-vous rempli le réservoir ?

نعم  
oui

لا  
non

منذ اشتراكك للوقود آخر مرة كيف كان تقريبا استعمالك للسيارة؟  
depuis le dernier achat de carburant quel a été approximativement l'usage de véhicule pour:

29

أ - ذهاب و اياب للعمل  
se rendre au lieu de travail (encadrer une réponse)

100 % 3/4 1/2 1/4 0

30

ب - استعمال مهني آخر  
autre usage professionnel

100 % 3/4 1/2 1/4 0

31

ج - استعمال خاص  
usage personnel

100 % 3/4 1/2 1/4 0

32

ضع اشارة الخزان على الصورة التالية  
marquer la position de l'indicateur du carburant

قبل ملئ الخزان  
avant remplissage du réservoir



بعد ملئ الخزان  
après remplissage du réservoir



34-41

العدد الرتبي بالمنضم  
(à relever de la carte grise) numero du châssis