

TRINIDAD AND TOBAGO - EUROPEAN COMMUNITY
COOPERATION

TRINIDAD AND TOBAGO
JOINT ANNUAL REPORT 2004

Prepared Jointly by the
Delegation of the European Commission
and the
National Authorising Officer of the European Development Fund

November 24th 2005

Finalised by the NAO and the EC Delegation on November 24th 2005

1. EXECUTIVE SUMMARY

The Government of the Republic of Trinidad and Tobago (GORTT) remains committed to an integrated and people centred policy of social and economic development with a target of reaching developed country status by year 2020 (Vision 2020). The various sectoral Vision 2020 committees (in which civil society is well represented) have now all submitted their reports which are being consolidated into a National Strategic Plan 2020.

Politics. The current government's parliamentary position remains strong and increasing tax revenues have allowed government to significantly increase social spending on health, education and on programmes to help the less privileged and to reinforce the rule of law. There have also been important initiatives in the public service reform, in promoting integrity in public life, and in improving access to government information. The GORTT also began playing an increasingly significant regional leadership role.

Economic. The economy continues to grow strongly on the back of buoyant energy exports, and GDP reached TTD 66,026 million in 2004. Inflation has held steady (although inflation on food items rose) and the TTD (pegged to the USD) fell significantly against the Euro. The trade surplus continued to increase dramatically. The balance of trade with Caricom partners remains highly favourable, a factor which has prompted the Government to introduce a compensatory aid mechanism triggered by high energy prices. The Ministry of Finance continues to introduce changes in public sector accounting to improve transparency, and the re-basing of national income statistics has considerably improved the accuracy of economic information.

Social development. In 2004 the social sectors accounted for 56% of government capital expenditure and TTD 934 million was spent on specific social programmes. Education, which is the focal sector for the 9th EDF accounted for TTD 468 million of the 2004 capital budget. In the tertiary education sector, the reform strategy is already beginning to take shape and the new University of Trinidad & Tobago (UTT - based initially on existing institutions) is now operating in some subject areas. The new Accreditation Council is a reality and the restructuring of COSTAATT has begun. In the 9th EDF non-focal area of health, the National Aids Coordination Committee (NACC) and its secretariat are now well established and operating on the basis of WB and national funds.

Overview of co-operation. Significant progress was made in finalising the 9th EDF non-focal programme to combat HIV/AIDS. The draft Financing Proposal finalised end 2003 had to be redrafted to new FP guidelines but was approved end 2004 and the Financing Agreement was signed by the Commission in December 2004; this is now with the T&T authorities awaiting signature. The draft financing proposal for the 'focal area' programme on the reform of tertiary education will soon be formally submitted by the NAO to the Commission and reflects important new developments in defining the post-secondary education policy framework. Most notably it reflects the decision to establish the new technical University of Trinidad and Tobago with which COSTAATT will have a close relationship. The FP is now reformatted as a sector support programme and should be presented to the EDF Committee in 2005.

Programming perspectives. Funds from previous EDFs rolled into the 9th EDF will be allocated to the focal and non-focal sectors in the 80:20 ratio agreed in the Country Strategy Programme (CSP) 2002-7. The Government remain committed to the two focal/non-focal areas of tertiary education and HIV/AIDS and no change of strategy is envisaged. The existing 9th EDF 'B' envelope was to have been radically cut in the MTR process but Hurricane Ivan and the solid case put by the GORTT led to it being restored. The Government is currently rethinking its disaster preparedness strategies and the reprogramming of the 'B' budget line will take place against that background.

2. UPDATE ON THE POLITICAL, ECONOMIC AND SOCIAL SITUATION

2.1 Update of the Political Situation

There were no major changes in the political situation between 2003 and 2004. Parliament and other institutions of democratic government have functioned normally. Human rights and the freedom and independence of the Judiciary are well entrenched in the Constitution and respected. The ruling Peoples National Movement remains in power with the United National Congress still in Opposition. However, attempts to pass legislation requiring a special majority to increase the penalties for fraud, kidnapping and serious crimes involving firearms were frustrated in the Parliament by the Opposition who had been calling for constitutional reform as a prerequisite for their support. Specifically, the Police Reform Bill was defeated.

Within the Cabinet, there were minor changes of portfolio with the resignation of the Minister of Labour, the replacement of the Attorney General who was appointed High Commissioner to the United Kingdom; and the change in the Minister of National Security. The Ministry of Planning and Development, wherein the National Authorizing Officer is located, also saw a change of ministers.

In 2004, Transparency International, which measures the degree of corruption as perceived by business people and country analysts from a range of 10 for “highly clean” to 0 for “highly corrupt”, gave Trinidad and Tobago (T&T) a rating of 4.2. The country was listed at number 51 out of a total of 146 countries. The rating was 4.6 in 2003 and the country was listed at 43.

Increasing tax revenues, most notably those deriving from the buoyant energy sector, have allowed the Government to significantly increase social spending on health, education, social services designed to help the less privileged and initiatives designed to reinforce the rule of law. There have been initiatives in the reform of the public service, in promoting integrity in public life and in improving access to government information.

T&T began playing an increasingly significant regional leadership role. Prime Minister Patrick Manning took the initiative in discussing political integration with Grenada and St. Vincent and the Grenadines. The Government introduced an energy revenue funded “trade deficit” compensation mechanism for its CARICOM partners and continued to fund the Caribbean Financial Task Force and the CARICOM Crime and Security Task Force. The country remained a key supporter of CARICOM objectives and was, together with Jamaica and Barbados, considered effectively “CSME ready” by 2004. Initiatives towards establishing the Caribbean Court of Justice, which will be based in Port of Spain, were put in place. T&T, given its robust financial asset base has supported its Caribbean partners in the aftermath of natural disasters and did so generously subsequent to Hurricane Ivan.

T&T also continued to develop relations with Latin America. The Prime Minister was the key CARICOM participant at the 2004 EU-LAC Summit, T&T continued to support the ACS whose Secretariat is based in Port of Spain, and T&T is a leading candidate to host the secretariat of the FTAA.

2.2 Update of the Economic Situation

2.2.1. Economic Performance

T&T is well advanced in its programme of trade liberalisation and is set to open its borders fully to the Caribbean Single Market and Economy (CSME). A special CSME Unit was officially launched on 7 May, 2004 in Port of Spain. The Trade Sector Support Programme was also initiated, with an IDB loan of USD 2 million (TTD12.6 million) and a government contribution of USD 2.1 million (TTD 13.2 million) with which to improve T&T's competitiveness in the international market, increase capacity building etc.

The growth rate in the Gross Domestic Product (GDP) for 2004 has been estimated at 6.7 percent (as compared to 13.7 percent in 2003 using the rebased national accounts series which uses 2000 as the base year instead of 1985). T&T continues to benefit from increased international trade and favourable oil and gas prices.

The annual rate of inflation for the period January to November 2004 was 3.4 percent as compared to 3.8 percent for the corresponding period in 2003 (*Index of Retail Prices – November, 2004; CSO*) in spite of the rapid rise in food prices which reached 13.8 percent in 2003 and 10.5 percent in the 12-month period to August 2004.

The exchange rate, which is closely aligned to the United States dollar (USD) stood at an average of TTD 6.2398 for the 2003/2004 period. Like the US dollar, the TTD has fallen steadily against the Euro.

T&T remained very active in Foreign Direct Investments, both as a recipient and as a source for regional initiatives. The country maintained a high interest in world trade issues and has a clear policy to promote Special and Differential Treatment for SIDS in the Doha agenda. The country also continued its support for new Free trade Areas with CARICOM and Latin America and played a key role in the Economic Partnership Agreement negotiations

2.2.2. Economic Structure

The energy sector, comprising petroleum and natural gas, continued to be the main driving force in the economy. Measured at current market prices in 2004, the energy sector contributed 34.1 percent of the GDP. The growth in the energy sector for the period was 10.5 percent. The production of petrochemicals and refining, including LNG, are increasingly contributing more and more to the performance of the sector. The construction of the Atlantic LNG Train IV project, the largest singly Natural Gas Train in the world got underway in 2004.

Overall growth in the non-energy sector was estimated at 2.9 percent with mixed performances among Manufacturing (6.6 percent); Agriculture (-20.2 percent) and Services (2.9 percent). Within the Services Sector the major contributors among the sub-sectors included, Distribution and Restaurants with 14.7 percent; Finance, Insurance and Real Estate with 12.5 percent (*Gross Domestic Product of Trinidad and Tobago 2000 – 2004, CSO*).

The planning of two new industrial estates at Wallerfield (for high-tech and light manufacturing industries) and at Union Estate, La Brea (for petrochemical, manufacturing based industries) progressed. Together with the proposed Aluminium Smelter plant at Palo Seco, these new initiatives reflect the Government's efforts at diversifying the economy away from an overdependence on oil and gas exports.

The operations of Caroni (1975) Limited (the largest state-owned and locally integrated sugar combine) were brought to a close and two companies, the Sugar Manufacturing Company Limited and the Estate Management and Business Development Company were established.

Along with the retrenchment of the company's programme of training, re-training and re-employment of a large number of ex-sugar workers was intensified.

The recent Global Forum Growth Competitiveness Index placed T&T at 51st, down from the previous year's position of 49th. This reflects the difficulties faced by competition from other countries and the need for T&T to make more aggressive strides in creating and strategically combining strong, basic economic factors (such as natural resources, climate, location, semi-skilled labour) with advanced factors (namely, highly educated labour, modern digital telecommunications and network readiness, research institutions and centres of excellence in sophisticated disciplines). There are new policy initiatives to promote an 'innovation culture', but these will take time to make an impact.

2.2.3. Balance of Payments

T&T recorded an overall balance of payments surplus of USD 577.2 million (4.8% of GDP) during the first nine months of 2004. This figure compares with a surplus of USD 48 million (0.4% of GDP) for the corresponding period in 2003. The surplus was attributable to increases in the current account even as the capital account moved into deficit due to outflows to finance foreign acquisitions and placement of securities. For the first quarter of the fiscal year 2003/2004 visible trade recorded a surplus of TTD 2,071.8 million (USD328.9 million) due to the trade in minerals.

Net foreign reserves as at the end of 2003 stood at USD2201.8 million. As at September 2004, the reserves had increased to USD 2.8 billion or the equivalent of about seven months imports of goods and services.

2.2.4. Banking and Finance

The financial system remained highly liquid due to the injections in the economy associated with expansions in Government expenditure. The Central Bank managed this liquidity through open market operations, such as, the issue of Treasury Bills and Notes. The Central Bank maintained the 5 percent Repo rate (overnight financing rate to commercial banks) since domestic conditions had not changed significantly. The low, stable interest rates prevailing within the commercial banks would have prompted investors to switch funds into higher yielding investments outside the banking systems.

The prime lending rates among commercial banks declined from 9.5 percent at the end of 2003 to 8.75 percent in October 2004. Similarly, mortgage interest rates also declined from 12.50 percent in October 2003 to 9.50 percent in April 2004. This has resulted in an increase in private sector credit demand with loans increasing by 15.5 percent over the six-month period October 2003 to March 2004.

In July 2004, the Government introduced a new single price auction system for bonds to promote a secondary market for government securities, such that, all successful bidders are allocated securities at a cut-off price which would allow for absorption of the entire issue.

2.2.5. Fiscal Operations

Based on a weighted average oil price of USD 30.60 per barrel, the revenue for fiscal year 2003/2004 was projected at TTD 20,192.6 million with surpluses on both the Current Account and Overall Balance of payments. In the fiscal year 2004/05, the GORTT's total revenue is estimated to be TTD 24,015.5 million.

2.2.6. Public Debt

Gross Public Sector Debt at the end of FY 2003/4 was TTD 37,125 million or 52.7 percent of GDP compared to 51 percent in the preceding period. However, the external debt declined from 15 percent of GDP in 2002/03 to 13.6 percent in FY 2003/04 following the repayment of some existing loans. The Government took advantage of the low interest rates to refinance a sizeable proportion of its domestic debt.

2.2.7. Employment

For the period July 2003 to July 2004 the unemployed persons as a percentage of the labour force was 7.8 percent (*Labour Force Bulletin 3rd Quarter 2004, CSO*). This compares favourably with the 10.3 percent recorded at the end of September 2003. The primary employment generating sectors were the Community, Social and Personal Services sector; Trade Restaurants and Hotels; and the Construction sector.

2.2.8. Trade

The improved external position reflected a robust current account surplus as the merchandise trade balance expanded due largely to increased exports of LNG, petroleum and petrochemicals. Total exports for the period January to September 2004 amounted to TTD 30,254 million while total imports over the same period were TTD 23,034 million representing a trade surplus of TTD 7,219 million for 2004. This compares to a favourable balance of TTD 6,027 million for the same period in 2003. The expansion was due to increased volumes and values of petroleum and natural gas and related petrochemicals. Notably, the food import bill for the period saw a decrease from 8 percent of total imports in 2003 to 6.9 percent in 2004 (*Trade Bulletin Vol 12 No. 346, CSO*).

The balance of trade with CARICOM partners remained highly favourable a factor which has prompted the Government to introduce a compensatory aid mechanism triggered by high energy prices.

2.2.9. Quality of the Management of Public Finances

In 2003, the international rating agency, “Standard and Poor’s” rating of the country’s long-term local currency debt credit rating was A+; the long-term foreign currency debt credit rating was BBB and T&T’s short-term foreign currency debt was A-2 as the results of the Governments’ high performance. For 2004, the corresponding ratings for local currency debt were A+ and the foreign currency debt was BBB+. This was the second successive upgrade for T&T in just over one year.

2.3 Update of the Social Situation

In keeping with its theme for 2004 “Charting the Course to 2020: Empowering People (*Budget Statement 2004 Ministry of Finance, Government of the Republic of Trinidad and Tobago, October 6, 2003*) the focus of public expenditure was on Education, Health, Housing, Social Services Delivery, Community Development, Integration and Security.

The overall budget for the Public Sector Investment Programme 2004 was revised upwards from TTD 1,677.5 to TTD 1,820 million. This increase was facilitated by a supplementary appropriation. The PSIP highlighted Government’s commitment to human resource development towards which a significant proportion of the overall financial resources of TTD 934 million or 56 percent was allocated. The programmes are focussed on the critical issues of human

development, poverty alleviation, social integration, wellness and well-being, personal security and safety, community development and empowerment and sustainable livelihoods.

The level of security enjoyed by citizens was the most critical problem facing T&T (*Budget Statement 2004, dated October 6, 2003*). The Government's response has been to set up a Special Crime Fighting Unit headed by the previous Commanding Officer of the TT Regiment and made up of professionals from all arms of the Security Services (Police, Regiment, Coast Guard, Prison, Fire, and Volunteer Defence Force) and the civilian population. Additionally, in 2004, the Coast Guard and Defence Force received upgraded equipment. A total of TTD 94.2 million was expended on public order and safety in an effort to upgrade and enhance capacity and increase the efficiency, effectiveness and impact of the security services.

Another critical problem was that in spite of increasing revenues from the energy sector, there is still an unacceptable level of persistent poverty with approximately 23% of the population living below the poverty line. This has serious implications for social stability and the level of crime.

Government's capital investment in 'Education and Training' for 2004 nearly doubled to TTD 468 million compared to TTD 287.8 million in 2003. The Government Assistance for Tuition Expenses (GATE) programme facilitated an increase in enrolment in tertiary education from 17,000 in 2003 to 24,000 in 2004 (or an increase of 40 percent). This compares with the previous Dollar for Dollar programme on which TTD 60 million was expended in 2003. Recurrent expenditure for the sector amounted to TTD 2.491 billion in 2004 compared to TTD 2.08 billion in 2003.

In 2004, approximately TTD 272 million was allocated to capital investments in 'Health', however, overall investment in the sector amounted to TTD 184 million including TTD 134 million under the IDB-assisted programme. The investments included the construction of the new hospital at Scarborough, the construction of Health Centres and the launch of the NACC and NACC Secretariat. Recurrent expenditure for the sector was TTD 1.441 billion in 2004 compared to TTD 1.262 billion in 2003.

The GORTT/World Bank assisted HIV/AIDS Prevention and Control Programme commenced with the establishment of the National AIDS Coordinating Committee (NACC). Government also subsidised the cost of Adult Cardiac treatments and offered free renal dialysis.

Under 'Housing and Settlement', Government's expenditure amounted to a total sum of TTD 151.4million including new structures, improving and maintenance of existing housing estates and the regularization of squatters. Resources amounting to TTD 10.3 million were allocated to the provision of home improvement grants to disadvantaged house owners.

The overall allocation for improvements to social and community services was TTD 114.2 million of which TTD104 million was utilized. The Social Services Delivery within the Office of the Prime Minister was provided with TTD 18.2 million. The EU-funded Poverty Reduction Programme continued its activities aimed at establishing a micro-project fund, a micro-credit fund and setting up a network of information and resource centres. Consultations were held with the Regional Corporations on the establishment of information and resource centres to support the identification and mobilization of entities in the delivery of social services.

Human Development

In 2004, the expenditure for improvements to Social and Community services in 2004 was TTD 104 million. This included an allocation of TTD 18 million to the Social Services Delivery unit in the Office of the Prime Minister. The IDB-assisted Community Development Fund (CDF) received an allocation of TTD 39.5 million from Central Government Revenues to continue its programme since the IDB loan ended in March 2004. USD24 (TTD 151.2) million of the original loan of USD 28 (TTD 176) million was disbursed. The Government intensified its assault on HIV/AIDS and launched the National Strategic Plan. Altogether, TTD 934 million (or 56 percent) of the budget was expended on Social Infrastructure. Considerable support continued in a range of employment generating programmes which helped in the short-term to reduce unemployment. Some of these included: the Unemployment Relief Programme (URP); CEPEP; the On the Job Training Programme; YTEPP; the Civilian Conservation Corps (CCC); the Youth Apprentice Programme in Agriculture (YAPA) which was allocated TTD 3 million to introduce youths to technical knowledge and skills in specialised areas of agriculture through theoretical and practical training exercises; the Youth Development and Apprenticeship Centres Programme, the National Skills Development Programme; the Youth Facilities Development Programme; the Helping Youth Prepare for Employment (HYPE) which was merged with the National Skills Development Programme (NSDP) under the MIC and the Re-training Programme for Displaced Workers.

Some of the programmes categorised as 'Poverty Alleviation', included: the School Nutrition Programme; the Disability Assistance Programme; the School Book Grant Programme; the Support to NGO; Provision of Textbooks for Primary Schools; Free Student Transportation; Textbook Rental/Loan Programme; the Social Help and Rehabilitation Efforts Programme (SHARE); and the Chronic Disease Assistance Programme (C-DAP).

Table 1 Indicators Relevant to Ten Millennium Development Goals.

Type	Indicator	2000	2001	2002	2003	2004	2005	2006	2007	2015 Target
Impact	1. Proportion of population below \$1 per day		12.4*							
	2. Prevalence of underweight children (under-five years of age)		7*							
	3. Under-five mortality rate (per 1000 under 5 population)	5.17	5.62	6.11						
Outcome	4. Net enrolment ratio in primary education (%)	92	92	93						
	5. Primary Completion Rate (%)	99.4	99.7	99.7						
	6. Ratio of girls to boys in (per 100 boys) in:									
	- primary education	96.6	94.7	95.5						
	- secondary education	110.1	103.8	107.7						
	- tertiary education	96.4	96	96						
	7. Proportion of births attended by skilled health personnel (%)	99.03	99	99.03						
	8. Proportion of 1-year-old children immunised against measles (%)	90	91	90						
	9. HIV prevalence among 15-24 year old pregnant women (per 10,000)	5.70	2.5							
	10. Proportion of population with sustainable access to an improved water source	90								

Sources: Central Statistical Office provided the information for items 3, 4, 5, 6, 7. /// Ministry of Health for item 8. National HIV/AIDS Surveillance Unit, Ministry of Health for Item 9; UNDP Human Development Report 2004 for item 10 UNDP-HDR 2004. 1995-2001 for items 1 and 2

The lack of data available in Table 1 illustrates the difficulty in assembling indicators on the ten millennium development goals for the most recent years. The lack of data is due to a number of reasons including – i) no customised national or regional poverty and social development goals agreed upon; ii) MDG targets and indicators not introduced into Government Department and statistical offices and iii) too often, missing data not prioritised as a problem and difficulties arise from inconsistent definitions. There is thus a need for improvements to the statistical data collection and analysis systems so that timely and accurate information can be used to judge progress in achieving the Millennium Development Goals and progress in the 9th EDF focal and non-focal sectors. One of the objectives of the T&T TCF, funded with resources from the 9th EDF, will be to assist the CSO in providing the social statistics essential to the monitoring of the focal and non-focal areas. The UNDP 2004 HDR for T&T, currently awaiting completion, will also improve the quality of the statistical data, especially with respect to health and HIV/AIDS. When more up to date figures are available it intended that the MDGs will be customised to be more relevant to the needs of T&T because T&T is already on target to meet most MDGs.

3. TRINIDAD AND TOBAGO'S DEVELOPMENT AGENDA

The Government has made a commitment for T&T to achieve “Developed Nation” status by the year 2020. The overall objective of Vision 2020 is to create an environment where citizens can enjoy an enhanced quality of life in the areas of education, health, housing and personal security, comparable to the highest standards obtained in modern societies. The aim is for the country to achieve standards of performance in all dimensions (economic, social, environmental, technological and institutional) similar to those of developed countries. The planning process for “Vision 2020” involved the work of twenty-eight Sub-Committees and has been spearheaded by the Multi-Sectoral Core Group. In 2004 the process also involved widespread public consultations and participation during which civil society was well represented (*Public Sector Investment Programme 2005: Vision 2020—Ensuring Our Future Survival, Ministry of Planning and Development and Ministry of Finance, October 2004*).

The strategic development focus will be on promoting high levels of economic growth, diversifying the economy, eradicating poverty, improving the quality of life through social development, modernizing infrastructure, increasing competitiveness, expanding and deepening the use of technologies and enhancing public sector efficiency in service delivery.

In 2004, major policy initiatives were instituted in the focal sector for the 9th EDF (post secondary and tertiary education and training) including the decision to introduce the University of Trinidad and Tobago (UTT). The UTT has been mandated to develop industry–level graduates, promote innovation and facilitate enterprises for job creation and wealth generation. The UTT will incorporate the Trinidad and Tobago Institute of Technology (TTIT); the Engineering Tool and Die functions of the Metal Industries Company (MIC); the Caribbean Industrial Research Institute (CARIRI) and the Institute of Marine Affairs (IMA). It has also been proposed that the UTT incorporate the College of Science, Technology and Applied Arts of Trinidad and Tobago (COSTAATT) and its campuses such as the John S. Donaldson Technical Institute (JDTI); the San Fernando Technical Institute (SFTI); the Eastern Caribbean Institute for Agriculture and Forestry (ECIAF) and the Point Fortin Vocational Centre (PFVC); but as yet there is no formal link and they are currently deemed separate entities.

The Accreditation Council became a reality in September 2004 and key staff are being recruited.

Approximately TTD 468 million was invested in the high priority training sector in the form of upgrades of facilities, the reform of curricula at all levels and the reform of systems and institutions towards a coherent and seamless education system.

In the 9th EDF non-focal area of health, the National Aids Coordination Committee (NACC) and its Secretariat was established and became operational on the basis of World Bank and national funds. The EDF Financing Agreement was signed by the European Commission in December 2004 and is due to be signed by the T&T side imminently.

4. OVERVIEW OF PAST AND ONGOING COOPERATION

Since the beginning of the EU's cooperation with T&T, EDF funds have been largely concentrated on transport infrastructure, poverty alleviation, economic diversification and employment creation. Implementation was slow due to administrative bottlenecks in the Commission and human resources and institutional constraints in the T&T administration; it was this factor which prompted the creation of an EDF Unit within the Ministry of Planning and Development to support the function of the NAO. There were also too many diversified projects under earlier EDFs which hampered smooth implementation. Given that infrastructural development can be best left to the Government and poverty reduction is already benefiting from an existing 8th EDF project, it was decided that the objectives of economic diversification and employment generation for the 9th EDF can best be met through fostering human development by concentrating on one programme in one focal sector; post secondary/non-university education. Health (specifically, HIV/AIDS) has been adopted as the non focal sector, also in the form of a single programme. All balances from previous EDFs were rolled over into one of these two programmes.

Discussions in early 2004 linked to the preparation of the 9th EDF Mid Term Review (MTR) and Joint Annual Review for 2003, confirmed the GORTT's continued commitment to the existing focal and non-focal areas and no change of strategy is anticipated. The MTR concluded that given the continued and strong government commitment to (post secondary) education and (HIV/AIDS) health, and the delegation's confirmation of the continued relevance of assistance to these two sectors of, there should be no change in the scope of the CSP and the 'A' budget allocation should be maintained. The 'B' allocation was to have been radically cut because T&T had not been affected by major natural disasters. However, the facility was maintained at existing levels following Hurricane Ivan and strong representations by the GORTT. Despite administrative delays it can be assumed that most 'A' funds will be committed in 2005 although there is always some element of risk.

Coordination with other donors and the involvement of non-state actors were consolidated. The possibility of creating a small grant scheme from existing resources (notably the B line) was proposed during the MTR but this was not pursued although the requirement remains.

During the year under review (2004) only 3 bilateral projects financed under the **8th EDF** were still being implemented, all earlier EDF funded projects having now been completed and are either closed or are in process of being closed. Programme preparations were undertaken and/or finalised for three new projects to be financed from the **9th EDF**, namely the 'Sector Policy Support Programme to Post-Secondary education', the 'Support to the National Strategic Plan for HIV/AIDS' and the 'Technical Cooperation Facility'.

The CSP for the **9th EDF**, the first financial protocol of the Cotonou Convention, was signed on 30th July 2002 with a financial envelope of Euro 17 million in grant resources. The focal area is **Education** (80%) and the non-focal area is **Health** (20%). The balance of funds available from earlier EDFs will be programmed into the same two areas and in the same proportion.

The preparatory study for the **EDF Tertiary Education Programme** funded under the 9th EDF was completed by the end of July 2004, however, there was a delay in drafting the FP due to both a change in FP formatting and to an extensive explanatory action to explain the advantages of a sector approach, essential for what will be the first Sector Policy Support Programme between the GORTT and the Commission.

The financing agreement for the **HIV/AIDS Programme** to be funded under the **9th EDF** was signed by the Commission in December 2004 and signature by the GORTT is now imminent.

The financing agreement for the **Technical Cooperation Facility (TCF)** to be financed under the **9th EDF** was signed in November 2004.

The financing agreement for the 9th EDF funded **Rural Electrification Project** was signed in June 2004. Project start-up has been delayed for a variety of reasons (including the priority given by T&TEC to post-Ivan and post-storm emergency work in T&T and Grenada). Despite the delays, the programme received good results from the monitoring mission and essential preliminary work is now proceeding.

The National Indicative Programme (NIP) for the **8th EDF** (Lomé IV *bis*) was signed in March 1997 with two focal areas; (a) economic diversification/employment creation, and (b) poverty alleviation. The **8th EDF** had a financial envelope of Euro 21 million in grant resources; comprising Euro 14.7 million as a first tranche with a second tranche of Euro 6.3 million subject to achieving performance targets. The **8th EDF** NIP mid-term review (Oct. 1999) concluded that although Trinidad and Tobago had broadly respected the NIP policy commitments, commitment rates and progress in meeting NIP targets were unsatisfactory. The second 8th EDF tranche was therefore not released.

The **8th EDF** funded **Caribbean Business Services Ltd Project Phase II (CBSL-II)** was approved early in 2003 and activities in support of the SME sector continued in 2004. The programme received good results from the monitoring mission.

The **8th EDF** project providing for the **Institutional Strengthening of the Office of the NAO** has been without a Coordinator since June 2004 although an excellent candidate commenced duties in early 2005. The programme ends in May 2005 and future support to the NAO will have to come from the TCF.

The **Poverty Reduction Programme** funded under the 8th EDF made significant progress in 2004 after its initial slow start, with many activities being started and a good number of results noted. The programme received good results from the monitoring mission.

The NIP for the **7th EDF** (Lomé IV) was signed in April 1991 with a financial envelope of Euro 18.1 million in programmable national grant resources, plus Euro 6.2 million from the Structural Adjustment Facility and a further Euro 1.1 million from global programmable ACP funds. The focal area of the **7th EDF** NIP was tourism development but this was revised jointly with the **6th**

EDF in July 1993 to prioritise (a) road infrastructure, (b) rural development, and (c) private sector development.

In 2004, there was no activity on **6th and 7th EDF programmes** and no further activity is expected. The low rates of disbursement under the **6th and 7th EDFs** were due primarily to disappointing performances on the following three projects:

- The **Youth Agricultural Credit and Training Project (YACTRAP)** had a very lengthy start up period, especially for the Trust Fund. Marketing and outreach activities were inadequate.
- The contract for the **Rehabilitation of the Solomon Hochoy Highway**, held by a Spanish firm, was terminated in May 1999 due to poor performance by the contractor. When Breach of Contract proceedings begun in February 1999, seventy percent (70%) of the contract period had expired with only 16 percent of the works completed.
- The planned **L'Anse-Fourmi Charlotteville Road Project** was not approved for EDF funding.

4.1 9th EDF Focal Sector: Education

'Education' is the focal sector for the 9th EDF and the planned Tertiary Education Programme will account for 80% of available resources. The total EDF commitment to the programme which may reach €27, 300,000 is in the form of macro-economic support, specifically, a Sector Policy Support Programme (SPSP).

4.1.1 9th EDF Focal Sector Programme

a) Expected results

The overall strategic objectives are the development of an internationally competitive labour force; and the development of equitable and effective education systems. The specific objective is to support the tertiary education reform process which will, inter alia, lead to:

- Developing a quality Seamless Education and Training System
- Free access to tertiary education by 2008
- Increase participation in post secondary and tertiary education to 60% by 2015
- Assist COSTAATT objectives on improvement of facilities and new programme offerings, establishment of communication networks, student support programmes and staff training.

In order to achieve these objectives, GORTT's policy will address three critical areas; namely, improving access, improving participation and enhancing quality. In furtherance of these broad aims and objectives, the following goals have been identified as priority areas for policy reform:

- Restructuring the system – through the development of a coherent and seamless tertiary education and training system, which is diverse and responsive to socio-economic development needs and goals and which comprises both public and private institutions.
- Widening access – through the adoption of an inclusive approach to education and training provision.
- Reforming the curriculum – to focus on basic education (with emphasis on Science, Technology, Mathematics, English Language, Social Studies and

Spanish); innovation; entrepreneurship and approached designed to prepare the country's human resource for effective citizenship.

- Financing the system– through the design and implementation of funding and resource allocation mechanisms that promote greater equity of access, efficiency in operations and improved quality of programmes and services among public and private tertiary education providers in support of national development goals.
- Managing the system – through strengthening of leadership and managerial capacity at the sectoral and institutional levels and enhancement of tertiary education research capacity to enable data-driven strategic planning, policy formulation and impact evaluation.

There was close consultations with the IDB in the initial design phase because of the interface between the EC's priority area (tertiary education reform) and that of the IDB (secondary education reform). A key lesson from IDB's experience has been the critical importance of a clear sector policy with solid government support.

b) Progress in Activities in the Focal Sector

The existence of a clear sector policy on tertiary education did not exist when the current NIP was signed but it has evolved considerably and positively since then. The existence of a coherent policy framework combined with sound macro-economic fundamentals has encouraged the GORTT and the EC to adopt the sector funding model in its revised FP draft.

During 2004, the feasibility study on the potential for reform of tertiary level education and training in Trinidad and Tobago was completed far later than planned due to severe tendering delays. The drafting of a Financing Proposal was also delayed due to changes in FP format, staff changes in both the NAO/EDF Unit and the EC Delegation, and the need to build support for the sector approach, which is a new departure in EC/T&T cooperation. A heightened degree of interest and urgency in finalising the FP is clearly evident among the key stakeholders.

c) Degree of Integration of Cross Cutting Issues

T&T has made good progress towards gender equality with women strongly represented in the Cabinet and Parliament, in the higher echelons of the administration, and in business. However, female to male earned income still remains low at around 45%. Women have excellent access to higher education where females already outnumber males by 1.5:1 (UNDP HDR 2003). Among gender issues, access to education is crucial as is the trend of the increasing number of males who are underperforming in the secondary system. Therefore, one key challenge for the focal point programme is to address the issue of access and school survival for boys. The problem of 'male dropouts' from the education system is both an educational and social problem and needs to be addressed through both education reform and other measures.

The mutually supporting links between education and health are well established, and budgetary support to the education sector will complement support to the 9th EDF non focal area of health (support to the National Strategic Plan to combat HIV/AIDS).

Similarly, there is a strong correlation between an educated population and increased understanding of environmental issues; of the role of civil society; and of the need for good governance and respect for human rights. These areas should all benefit from the knock on effect of an SPSP for education.

4.1.2 Macro-economic support

No macro-economic support programme currently exists although the planned modality for the focal area of education is a Sector Policy Support Programme (SPSP) which by definition is macro-economic support.

4.2. 9th EDF programmes outside the focal areas

The non-focal sector '**Health**' will cover a programme to support the National Strategic Plan for combating HIV/AIDS; this will account for the remaining 20% of available resources under the 9th EDF and the total cost of the project is estimated at €7, 130,00.

There is a '**Technical Cooperation Facility**' financed under the 9th EDF with a budget of €1,000,000. The TCF will fund measures be financed according to normal EDF procedures to improve the delivery of the NSP through technical assistance, (including support to the NAO's EDF Unit), studies, training and conferences.

4.2.1. Health

a) Expected Results

The programme will support the GORTT's National HIV/AIDS Strategic Plan and the overall objectives are to contribute to reducing the incidence of HIV and to mitigate the negative impact of HIV/AIDS on persons infected and affected in T&T.

To achieve the expected results the programme will support the strategic plan in five priority areas, namely:

1. **Prevention of the spread of HIV/AIDS** which involves communities in identifying ways to prevent sexual transmission of HIV and to reject major misconceptions about it.
2. **Treatment, care and support** through strengthening existing delivery system through the development of decentralised and integrated service provisions for HIV/AIDS sufferers.
3. **Advocacy and Human Rights** which would guarantee human rights by tackling all forms of stigma and discrimination, among the most vulnerable groups.
4. **Programme management, coordination and evaluation** through the provision of support to NACC activities, specifically, by facilitating legislative initiatives on HIV/AIDS discrimination in the work place and by measures to institutionally strengthen the NACC Secretariat and the HIV/AIDS Substance Abuse Commission in the Tobago House of Assembly.

5. **Implementation of the Tobago response** through strengthening the multipurpose health promotion clinic in Tobago to enable it to deliver comprehensive PLWHA services to the general and at risk population.

With regards donor cooperation, the 9th EDF Programme is a part of the National HIV/AIDS Strategy Plan and is complementary to other programmes and activities which assist the Government in the fight against the HIV/AIDS epidemic. In T&T, there are at least 13 major projects and programmes. Among the key donors and organisations operating in T&T either directly, or as a part of a regional intervention, are: CIDA, CAREC, CARICOM, EU/EC, GTZ, OAS, PAHO/WHO, UNAIDS, UNFPA, UNICEF, UNDCP, UNDP, UNV and the World Bank¹.

The multi-disciplinary/multi-sectoral National AIDS Coordinating Committee (NACC) will coordinate the activities of all institutions, groups and donors within the framework of the National HIV/AIDS Strategy Plan. The EC Delegation is represented on the NACC and on its Management and Finance sub-committee.

b) Progress in Activities

The financing agreement was only signed in Brussels at the end of December 2004 and is now ready for signature in T&T. This also puts the project a year behind the schedule in the CSP, in part due to earlier administrative delays which led to a late start by the consultants but largely due to the lengthy delay in rewriting the FP to new FP formats.

c) Degree of Integration of Cross Cutting Issues

The economic justification for the Project is anchored in the National HIV/AIDS Strategic Plan, the principal strategic action promoted by the Government of T&T as its national response to HIV/AIDS.

The country's economy may be regarded as the "economic motor" for Caricom and is projected to grow at 5% per annum in 2003-2005, with growth driven by expansion in the energy sector. The service sector accounts for 64% of employment, industry for approximately 14%. Construction and agriculture account for 11% each. T&T's competitiveness is enhanced because of its well-educated labour force and hospitable social and economic environment, but it is vulnerable to the loss of key workers and managers. In small economies, disability and death of key workers can have a disproportionately higher impact on economic prospects than in larger economies with larger labour markets. HIV and AIDS in Trinidad and Tobago mainly affect the population aged 15-49 years, in particular males (62%) although over half of new cases are females. As this segment of the population is the key pool of labour supply, the epidemic poses a substantial potential threat to economic growth in Trinidad and Tobago. Therefore, government intervention and a key role for the public sector in efforts to minimise the risks of mortality due to HIV/AIDS are well justified.

Gender issues are specifically addressed through the proposed HIV/AIDS Programme through counselling, care and treatment for men and women, and through a spread of

¹ MATRIX, Activities of Agencies Involved in HIV/AIDS in the Caribbean Region. FINAL COPY - March 2003. Pan Caribbean Partnership/CARICOM Secretariat, with support by CDB, CIDA, UNAIDS

measures related to mother-to-child transmission. Although HIV/AIDS is not a uniquely poverty related condition the programme will specifically benefit those whose poverty restricts their access to advice and care.

4.3 Earlier EDFs

4.3.1 8th EDF Focal Sector: Economic Diversification/Employment and Poverty Reduction

The NIP for the 8th EDF was signed in March 1997 with two focal areas; (a) economic diversification/employment creation, and (b) poverty alleviation. The 8th EDF had a financial envelope of €21 million in grant resources - €14.7 million as a first tranche with a second tranche of €6.3 million subject to achieving performance targets. The 8th EDF NIP mid-term review (Oct. 1999) concluded that although Trinidad and Tobago had broadly respected the NIP policy commitments, commitment rates and progress in meeting NIP targets were unsatisfactory. Too many (ill defined) projects and administrative delays played a role, together with start-up and implementation problems with major infrastructure projects (one was not accepted by the EDF Committee, and the other hit major problems with the EU contractor). The second tranche of EDF 8 was therefore not released.

The 8th EDF focal sectors were “economic diversification/employment creation” and “poverty reduction”. The first of these is addressed through 2 projects ‘Support to Caribbean Business Services Project (CBSL) Phase II’ (€2.0 m.), which concerns private sector development. This highly successful programme has close links with the CDE. Poverty Reduction is addressed through a specific ‘Poverty Reduction Programme’ (€6.0 m.). ‘Rural electrification’ (€1.8 m.), approved by the Commission in December 2003 and signed in June 2004 addresses both priorities.

4.3.2 Support to Caribbean Business Services Ltd. (CBSL) II (€1,982,000)

The project’s aim is to increase the competitiveness and export readiness of small and medium manufacturing and service companies, and to assist the growth and diversification of the non-energy sector. CBSL II provides demand-driven support to the Small and Medium Enterprises (SMEs) by way of managerial, marketing and technical advice and transfer of technology. The project began in June 2003 and by December 2003 the company had already facilitated 24 assignments using 281 man-days of consultancy time. The Government of Trinidad and Tobago provided bridging funding for CBSL I during the period April 2002 to June 2003 prior to the implementation of the CBSL Phase II project.

Under the ‘Awareness Building Service’ clients contribute 28% of the value of ABS services with the CDE contributing 50% and CBSL the remaining 22%. Under the ‘Competitiveness Building Service’ clients contribute 44% of the value with CDE contributing 45% and CBSL the remaining 11%.

In 2004, the project has run smoothly and received positive feedback from the monitoring mission in October 2004.

4.3.3. Rural Electrification (€1,850,000)

Although addressing 8th EDF focal sector priorities, the project is actually financed under the 9th EDF. The main purpose of the project is to improve the living conditions of households in isolated target communities of Trinidad and Tobago where it is currently uneconomic for the national supplier to operate. Once connections are provided, supply becomes economically viable. The project supports poverty alleviation because access to electricity brings improved living standards and increased opportunities for employment. This project was approved by the EDF committee in December 2003 and although the financial agreement was signed in June 2004 a number of circumstances have delayed start up. These include T&TEC being overstretched in responding to emergency work, post Hurricane Ivan, in Grenada and Tobago. Additionally, a number of communities identified in the project preparation phase were electrified before the signing of the FA and consideration is still being given to a provisional list of new communities submitted by T&TEC which meet the criteria set out in the Financing Agreement.

The programme received good feedback from the monitoring mission in October 2004.

4.3.4. Poverty Reduction Programme (€6,000,000)

The Poverty Reduction Programme began in December 2001 with an EDF grant of €6.0 million of which €1,894,847 was committed and €804,000 disbursed by end 2004. Its main purpose is to support Government in formulating and implementing a National Poverty Reduction Strategy, and decentralising the delivery system to make it more responsive to the needs of the most vulnerable groups of the population.

The project has the following activities:

- (a) Strengthening of the institutional framework for poverty reduction by:
 - i. Strengthening the management of poverty reduction actions that fall under the responsibility of Office of the Prime Minister.
 - ii. Creating and providing technical support to the network of Regional Social and Human Development Councils that form the basis of the decentralized system; Cabinet approval to the RSHDC concept was only given in November 2003 but their work has now started, and with strong government support.
 - iii. Conducting poverty Audits to fundamentally improve policy-makers detailed knowledge of the shape and incidence of poverty.
- (b) Improvement of the delivery of poverty reduction services by:
 - i. Establishing a Micro-project Fund for financing group social projects;
 - ii. Establishing a Micro-credit Fund for small businesses; and
 - iii. Facilitating a network of information and resource centres to coordinate delivery of social services to the poorest segments of the population.
- (c) Strengthening information systems on poverty and poverty reduction programmes through regular surveys and improved availability of and access to information on poverty.

The programme began slowly but in 2004 the project made real progress in a number of fields, in general with very positive results. The CMU has been transformed into a PMU with the strong support of, and located in, the Office of the Prime Minister. Installation of the first RSHDCs has taken place and the council members have already been given

training and support. A key achievement for the year has been the establishment of Networks of Regional NGOs and CBOs. The appointment and training of new staff within the PMU and of regional staff in the PIUs, continued studies on MPF and MCF are completed, and both instruments will be ready to start implementation in 2005.

Results so far are of good quality, reasonably on time and within cost (taking into account inflation and currency fluctuations). Final beneficiaries are being given full access to project results, and in the longer term will increasingly benefit from them. The programme will be encouraged to closely cooperate with the other ongoing EDF projects in T&T, especially the Rural Electrification Programme which also deals with poverty reduction through electrification of poor rural areas.

The programme received good feedback from the monitoring mission in October 2004.

4.3.5. Institutional Strengthening of the Office of the NAO (€576,200)

This project enhances the Government's institutional capacity and ability to prepare projects for EDF funding and to manage EC funded programmes by reducing institutional constraints and augmenting human resources. The EDF Unit established under this project began operating in May 2002 and of the total of €576,200 allocated, €40,500 was committed and €328,335 paid by the end of 2004. The work of the EDF Unit has been indispensable; both in terms of day to day operations (payment preparation etc) and in the preparation and launch of programmes. For instance in 2004 the EDF Unit facilitated the consultancy for the study for the reform of Post-Secondary Education drafted the Annual Review 2003 jointly with the EC Delegation, assisted in several evaluation and monitoring missions, and steered the financing agreements through the T&T administrative system.

Unfortunately, the EDF Unit was without a Coordinator for seven months following the resignation of the previous incumbent. An excellent candidate has now been recruited and took up her position in February 2005. The Unit still relies on the Delegation but the objective of the programme is that it becomes more responsible for EDF management. The institutionalisation of its EDF management role is to be prioritised and extended and this challenge was clearly defined and explained to the new incumbent during her interview.

4.4 Utilisation of Resources for Non-State Actors

CBSL Phase II targets the private SME sector, while the Poverty Reduction Programme (both 8th EDF) will benefit NGOs and low-income individuals and communities in Trinidad and Tobago through its micro-credit and micro-project facilities but they will also play a key role in programme policy definition and delivery. It is foreseen that strengthening CSOs through the PRP will engender further poverty reducing initiatives. The 9th EDF HIV/AIDS programme will be heavily dependent on non-state actors for its success. Civil society is active and well developed in T&T and consideration needs to be given to new ways of supporting its contribution to goals shared by the Commission, preferably through some form of flexible small grant programme.

4.5 Utilisation of envelop B

The 'B' envelope was frozen while discussions continued on whether or not it would be cut. Now that its future is clear it will be programmed in 2005.

4.6 Other Instruments

Not applicable

4.7 Regional Cooperation

Annex IX provides financial information on Regional Cooperation programmes. The following four regional programmes were managed and monitored from Trinidad and Tobago in 2004:

- Caribbean Agriculture and Fisheries Programme (CAFP) (Euro 22.2 million; 1997-2004)
- Caribbean Regional Anti-Money Laundering Programme (Euro 4 million; 1999-2004)
- Strengthening of Medical Laboratories (Euro 7.5 million; 2002-ongoing)
- Regional Radar Early Warning Network System (€13.2 million from the 8th EDF) 2002-ongoing

4.8 European Investment Bank (EIB)

EIB support to Trinidad and Tobago dates back to the First Lomé Convention and its operations have been mainly in the form of loans to DFL (Development Finance Ltd) to fund investments by small and medium-sized enterprises (SMEs). Currently active EIB loans can be found in Annex X. The second part of the table lists loans managed by the EIB on behalf of the European Commission.

Loans to DFL, an active Trinidad and Tobago based development finance institution, have been made from own resources for on-lending as senior loans, and as a risk capital facility to invest in innovative SME's. The EIB has also provided risk capital, for making of equity or quasi-equity investments in SMEs. It is believed that considerable potential for EIB activity exists in T&T, not least because the EIB can now operate in the 9th EDF focal and non-focal sectors of education and health. It is also increasingly interested in extending its activities to other services. Five visits were made to T&T in 2004.

5. PROGRAMMING PERSPECTIVES FOR THE FUTURE YEARS

The 2004 MTR confirmed the existing 9th EDF focal sectors of education (tertiary education reform) and health (HIV/AIDS) and government's commitment to these two sectors is strongly expressed and strongly supported in the current budget. There will be the need to maintain the commitment if T&T is to make real progress in its 2020 vision of reaching developed country status by 2020. Given the sheer scale of investment required it is likely that considerable scope for EU-T&T cooperation will remain for future programming, especially if the sector approach (which is being adopted for the first time for the 9th EDF tertiary education project) can be shown to work.

The status of the two principal 9th EDF programmes (HIV/AIDS and Tertiary Education Reform) is mixed. The Financing Agreement for HIV/AIDS was signed by the Commission in December 2004 and should be signed by the GORTT soon. Although it is not a sector programme, the delivery structure (the NACC) is in place and already managing the World Bank's USD 20

million contribution. One can therefore have some confidence that the EDF funds can be managed and disbursed in the timeframe. The FP for tertiary education has been a long time in preparation but has also involved the introduction to EU/T&T cooperation of the sector funding approach which marks a very new concept for several of the key actors and stake-holders involved. The delay has also allowed discussions on tertiary reform to evolve to the extent that the policy framework within which EDF funds will be committed is now considerably clearer and more coherent than when programming was first undertaken.

The programming of the 'B' line has not yet been undertaken for the very good reason that the initial conditions for its release were inappropriate for a country like T&T. Furthermore in the 2004 MTR process it appeared likely that much of the B line budget would be re-assigned elsewhere. Hurricane Ivan and strong representations by the T&T government resulted in the restoration of the B budget line. The government is currently totally rethinking its disaster preparedness strategy in the light of lessons learnt in T&T and in Grenada during and after hurricane Ivan and the background conditions are now far more appropriate than previously to look again at this issue. The Delegation has accordingly signalled its intentions to begin discussions on the 'B' line with appropriate counterparts as soon as possible.

The process of closing down old projects and contracts has proceeded well in 2004 and will continue. No particular problems are foreseen although a time extension will be sought for the important regional 'Strengthening the Capacity of Caribbean Medical Laboratories' (Medlabs) on which the MTR reported in December 2004.

In laying down the basis for the programming of post 9th EDF funds it is important that programming objectives are closely aligned to T&T's ambitious development objectives of attaining 'developed country status' by 2020. The limited extent of T&T's energy reserves and the likely impact on T&T of increased global competition (especially from China) make it essential that T&T's economy and society are radically transformed in a relatively short time if it is to meet the challenges of the future. In many ways, T&T is facing similar challenges of transformation that many of the EU's new Member States have had to face and this should be reflected in the future programming. Greater attention will need to be given to the mix of EDF grant support and other transformation inputs, notably EIB activity and direct foreign investment from the EU. Greater attention should also be paid in programming to the key economic and financial role played by T&T in the CARICOM region. It is the region's 'economic motor', and with Barbados and Jamaica provides the region with its political critical mass.

Given the requirement in a small country like T&T to concentrate EU cooperation support on one or two sectors there remains a considerable problem in addressing the EU's wider objectives beyond those addressed by the proposed actions in health and education. The 2003 JAR outlined some of these and proposed that at least some could be effectively addressed by a small grant programme funded from the existing budgetary envelope. The situation has not changed, indeed events in 2004 have confirmed the extent to which such an approach could be both cost effective and highly beneficial to the EU's external relations objectives in the region. In similar vein the discrepancy remains between the potential for constructive political dialogue (on issues of demonstrable common interest like conflict prevention, anti-terrorism, trade policy etc.) and the modest resources required to support concrete measures to support the dialogue. T&T's role as a regional player is increasingly important and programming should evolve to reflect this.

6. IN-COUNTRY DIALOGUE WITH THE NAO, NSAs AND DONOR COORDINATION

6.1 Dialogue with the NAO

Relations with the NAO are close and constructive and so too is the operational interaction between the EDF unit in the Ministry of Planning and Development and the cooperation section in the Delegation. But in 2004, there has been a problem of resources in both. There has also been a problem in making the transition to EDF 9 procedures with relatively limited training inputs. The resources problem is now effectively addressed with the filling of most vacant posts but the need for considerable training inputs remains.

Good relations between the NAO and the delegation are only part of the equation. Effective cooperation and programming also requires close collaboration with the key Ministries involved, and this is readily forthcoming and supportive. The situation is rather different however with regional programmes where T&T has sufficient critical mass to nominate sector ministries to act as DRAOs who bring the required sector competence to bear but often lack the administrative support required to do the job effectively. This is a general and not a T&T problem and the role of DRAOs needs to be given the same attention as has been given to NAOs.

6.2 Dialogue with the NSA

The substantive involvement of NSA in programming is a more realistic undertaking than previously, in part because NSAs in T&T are becoming better organised but also because the Delegation's and the NAO's knowledge of and contact with appropriate NSAs is much improved (in part through the workings of the Poverty Reduction Programme on the one hand and through close links with business and professional clusters on the other). Support to NSAs is also an increasingly important objective, especially in the areas of good governance, human rights, and environment. The GORTT is also increasingly open to working with NSAs. For example, business clusters and key Permanent Secretaries met in conference to improve business to government cooperation and the T&T section of TI has been able to significantly improve its relations with ministries on such issues as schools programmes and advice on reforming public procurement procedures.

6.3 Donor coordination

Non structured donor coordination in T&T, usually initiated by the donors themselves, is very good and the Delegation is regularly involved in discussions on policy and programming with key partners (e.g. with ECLAC on regional support to ICT, with IDB on overall programme issues, with UNDP on collaboration in poverty reduction programmes etc.). Relations between the Delegation and MS representations are also close although none of the latter has substantial bilateral activities underway. There is also very close structured coordination on HIV/AIDS, initially through an 'extended' HIV/AIDS theme group organised by the UNDP and subsequently through the National AIDS Coordination Committee (NACC) on which the Delegation is represented. With respect to coordination in working with NSAs, the Delegation collaborates closely with the NL embassy which is active in this area, and with others on an ad-hoc basis (with the UNIC on human rights briefings for journalists for instance). 2004 has also seen the re-launch of a grouping of donors involved in small grant activity to share information on activities and applicants and the working of the Poverty reduction programme has brought the Delegation into contact with a wide spread of grass-roots NGOs and CBOs.

The basis for formal but ad hoc coordination between the Delegation and MS missions is very strong and is shown to good effect in such areas as in organising the region's largest Euro Film Festival or the 2004 launch of the Caribbean Water Partnership. There was also a constructive involvement of T&T based MS missions in the 2004 MTR process which will be an excellent precedent for closer collaboration in 2005. But the critical mass of cooperation activity by MS is probably insufficient to justify the formal development collaboration structures that one might find in much larger countries with larger cooperation programmes.

7. CONCLUSIONS

7.1 Key political, economic and social developments in 2004.

T&T is a stable democracy with solid economic fundamentals based on a buoyant energy sector and well developed industrial and service sectors. But there are real problems with pockets of poverty and rising levels of serious crime.

Economically the major challenge is recognised as being the management of an effective transition from an energy driven economy to a more balanced service and knowledge based economy involving more downstream energy based activity and a more dynamic non-energy sector. 2004 saw many proposals for downstream investment although it is too early to say how many of these come to fruition. However the country's financial services sector has now clearly emerged as the region's strongest and it is increasingly active on a regional scale. Growth in manufacturing continues, and although T&T's manufacturing sector currently dominates much of the Caribbean market it is vulnerable to global competition. T&T is now effectively CSME ready even though the introduction of CSME, due by Dec. 2004, has been postponed.

Politically there has been little movement apart from minor Cabinet reshuffles by the ruling PNM administration. However overdue legislation which require a two-thirds majority (notably legislation to combat the deteriorating crime situation) failed because the opposition UNC has not been prepared to offer bipartisan support. On the diplomatic front T&T has been increasingly confident in playing a pro-active regional role within Caricom and in developing closer relations with Latin America.

Progress in social development has been mixed. On the positive side, investment in education, health and other social services has significantly increased and unemployment rates have fallen well below the norm in most Anglophone Caribbean economies. But crime rates have dramatically increased and although its impact on social development is strongly debated, all agree that it is negative and is one of T&T's greatest social challenges. The commissioning of the new University of T&T and the elaboration of a new strategic plan for tertiary education to provide the skills T&T will need to carry it through to 'developed country status' by 2020 are highly significant developments.

7.2 Progress achieved in Poverty Reduction

T&T's increasing GDP has moved it firmly into the 'middle income' category, but the proportion of the population living in poverty has remained stable over the last 25 years (although up to date statistics are not currently available); by extension, income differentials have increased. There is no shortage of anti-poverty activity by government ranging from job creation schemes, to increases in the minimum wage, to access funding for tertiary education students. But more clearly needs to be done. The EU supported Poverty Reduction Programme, which is now firmly on the move again, will help identify new options through its activities and most notably by more clearly defining the changing structure of poverty. But the key must be the further development of 'pro-poor' policies by government. "Trickledown" is clearly not a viable mechanism and 2004 has seen an increased political emphasis given to the need to confront poverty more robustly.

The EDF funded 'Rural Electrification programme' was approved in 2004 and substantial progress was made in defining its area of activity although concrete results in terms of connecting poor rural communities to the grid will not be apparent until 2005 and 2006.

7.3 Results and Activities in Focal Sectors and Relevant Programmes

The two main established EU funded programmes, the SME support programme ('CBSL') and the Poverty Reduction Programme, are relatively modest in funding terms but both have demonstrated real impact in 2004 on job creation and poverty reduction respectively. Both programmes have also generated a high (and positive) public profile. But the real challenge has been to forge ahead with launching programmes in the two 9th EDF priority areas, support to non-university tertiary sector reform (focal area) and to combating of HIV/AIDS (non-focal area); and here the balance of achievement is more mixed.

In the non-university tertiary education there have been serious delays in preparing the financing proposal but it is now on the point of being submitted to the Commission having been comprehensively revised into a sector budgetary support programme reflecting progress made by government in defining a fully evolved tertiary education reform strategy. The HIV/AIDS programme FP was submitted to Brussels in early 2004 and the financing agreement was signed by the Commission in December 2004; it is now on the point of being signed by the GORTT. The structure within which the EU programme will operate - the HIV/AIDS National Strategic Plan and the National AIDS Coordinating Committee (NACC) - became fully operational in 2004 on the basis of State and World Bank Funding; this augers well for the 9th EDF programme when it starts in 2005.

7.4 Key Perspectives for the future

Considerable progress was made in 2004 in closing down old programmes and on instilling 8th EDF programmes with new impetus. But progress in launching new 9th EDF programmes has been slow (see above) and it is clearly progress here that will largely define the immediate perspectives for the future. 2005 should see the start of activities on the HIV/AIDS programme but the first impact of the key non-university tertiary sector SBS programme will not be seen until 2006 even if the financing proposal is approved in 2005 as planned. However the context into which both programmes are being launched is undoubtedly more promising than was the case previously.

In the medium term the key challenge will be on programming the next cycle of support, which will in all probability be very strongly 'transition oriented' to reflect the real progress that T&T is making towards developed country status despite the constraints of small island status and increasingly fierce international competition.

A new short-term challenge will be to programme the 'B-envelope' which was to have been cut in the MTR exercise but has been restored. The emphasis will be on disaster preparedness although the arguments for a 'small grant facility' made in the 2003 MTR, still stand.

7.5 Efforts undertaken in the use of EDF resources in the refinement of indicators in focal sectors (and macro-economic support) and in dialogue with NSAs.

The primary support activity to optimise the use of EDF resources is 8th EDF funding of institutional support to the NAO via the 'EDF Unit'. This programme ends in mid-2005 but the

activities will continue but financed from the approved TCF. As an intervention, it has been broadly successful although the EDF unit was without a head of unit for much of 2004 which had a serious impact on its effectiveness. A new head of unit is now in place.

Indicators for HIV/AIDS already exist in the form of region-specific indicators developed by CAREC (the Caribbean Epidemiological Centre) with regional EDF funding on the basis of well established UNAIDS indicators. Indicators for tertiary education are more complex although substantive work on this was done by the consultants who helped define the programme and the GORTT has also developed indicators as part of its new tertiary reform policy deliberations.

Dialogue with NSAs on the elaboration of the JAR is not easy in a structured form although the more structured involvement of NSAs is recognised as a priority to be addressed and the EC Delegation has now assigned one staff member to this task. Nonetheless, the EC Delegation's working links with NSAs improved considerably over 2004 and NSA input into sector policy discussions on tertiary education and on health was considerable and structured through their systematic involvement in the deliberations of the '2020' planning committees. Their input is thus reflected in the design of 9th EDF in these areas. NSAs are also strongly represented in the NACC, the structure that will deliver the EU funded anti-HIV/AIDS programme.

7.6 Overall conclusion

2004 has seen broadly encouraging economic growth and socio-economic development although very substantial challenges remain, most notably in the development of the non-energy sector and in measures to reverse the increase in serious crime. Existing EU programmes are performing relatively well although the ambitious 9th EDF programmes have been slow to launch even though the context into which they will be launched is encouraging. The restoration of the B-envelope in late 2004 is welcomed and programming, with an emphasis on supporting disaster-preparedness, will be highly appropriate given T&T's significant potential as a regional asset in this field.

04/05 (amds/pa)

**TRINIDAD & TOBAGO
JOINT ANNUAL REPORT
2004**

ANNEXES

List of Annexes

- **I Intervention Framework**
 - a) for the focal sector (Education)
 - b) Overview of Policy Measures and Indicators for the Non-University Tertiary Sector Programme
 - c) for the non-focal sector (HIV/AIDS)
- **II Chronogramme – Schedule of Preparation and Implementation Phases of EDF Projects and Activities for the Period 2004 - 2007.**
- **III Forecast of commitments and disbursements 2005 – 2006**
- **IV Donor Matrix 2003**
- **V NIP of the 9th EDF – Financial Situation and Status Report of Projects funded (as at 31.12.04 in EUR)**
- **VI NIP of the 8th EDF – Financial Situation and Status Report of Projects funded (as at 31.12.04 in EUR)**
- **VII NIP of the 7th EDF – Financial Situation and Status Report of Projects funded (as at 31.12.04 in EUR)**
- **VIII NIP of the 6th EDF – Financial Situation and Status Report of Projects funded (as at 31.12.04 in EUR)**
- **IX Regional Programmes Executed from Trinidad and Tobago: Financial Overview December 2004**
- **X EIB Projects 2004**
- **XI Use of budgetary support/counterpart funds**
- **XII Project profiles**
 - Poverty Reduction Programme in Trinidad and Tobago
 - Support to the Office of the NAO (EDF Unit)
 - Caribbean Business Services Ltd
 - Rural Electrification
 - Technical Cooperation Facility (TCF)
 - Support to HIV/AIDS
 - Support to the Non – University Tertiary Sector
 - Strengthening of Medical Laboratories (MedLabs)
 - Radar Programme
- **XIII Migration Profile**
- **XIV Country Environmental Profile (CEP)**

ANNEX I Intervention Frameworks

a) For the focal sector: Education (from the proposed FP 30/04/05)

LOGICAL FRAMEWORK				
Overall Objective: Raise participation rate	Intervention Logic	Indicators	Sources of Verification	Risks and Assumptions
Overall Objective	To create the conditions for increasing the participation rate in tertiary education	<ul style="list-style-type: none"> • Admissions to tertiary institutions rise year on year to 15% of the age cohorts by 2010 • Unmet demand is eliminated • Information on tertiary opportunities is more widely available • Increased proportion of tertiary enrolments in non-university sector to 50% by 2010 • Access is widened for those with low CXC grades • 10% year on year increase in enrolments in science and technology courses • Workplace 	<p>Enrolment data</p> <p>All application forms processed and places offered</p> <p>Emigration to overseas tertiary institutions reduced by 10% pa.</p> <p>Comprehensive prospectus published</p> <p>Enrolment data</p> <p>Bridging courses operating and recruiting (100 students pa)</p> <p>Enrolment data</p> <p>Entries for TTNVQ</p>	Reform policies are not applied systematically and consistently

		<p>learning is extended</p> <ul style="list-style-type: none"> • Programme advisory committees established including employer reps. • Curriculum is revised to align with employer needs • New courses established to match unmet demand 	<p>certification (500 additional pa)</p> <p>Reports of newly constituted advisory committees</p> <p>Prospectus information</p>	
Project Purpose	To increase awareness of the benefits of tertiary education and training among the wider community	Increasing the proportion of the population who understand the role of tertiary education	Surveys	
Results	<ol style="list-style-type: none"> 1. Information disseminated 2. Understanding acquired 3. Enrolments increase 	<p>Secondary schools careers advice.</p> <p>Employers' manpower planning</p> <p>Fall in unemployment</p>		
Overall Objective: Increasing efficiency and reducing costs	Intervention Logic	Indicators	Sources of verification	Risks and Assumptions
	<ol style="list-style-type: none"> 1. To reduce Trinidad and Tobago's costs per student to approach regional /international norms (ca 5% pa) 	<ul style="list-style-type: none"> • Disposal of under-used facilities, including possible merger of institutions • Rationalisation of programmes to reduce duplication • Increase average class 	<p>Space utilisation factors</p> <p>Institutional prospectus</p> <p>Comprehensive prospectus</p> <p>Student/staff ratios, class</p>	<p>Institutional and/or trade union resistance</p> <p>Policies not applied consistently</p>

	<p>2. To provide the basis for effective planning of the sector</p> <p>3. Introduce formula-driven allocations to institutions</p> <p>4. Design and implement a national qualifications framework to facilitate student progression, and reduce wastage</p>	<p>sizes (ca 5%pa)</p> <ul style="list-style-type: none"> • Development of a comprehensive data base • Establish a sector planning cycle • Funding methodology published • Student flows within tertiary sector • Student flows from tertiary into higher education • Qualification framework compiled 	<p>size indices</p> <p>Annual planning reports</p> <p>Institutional strategic plans</p> <p>Institutional accounts</p> <p>Data base</p> <p>Data base University admissions data</p> <p>Student flows increase</p>	
Project Purpose	To achieve better value-for-money outcomes from the tertiary sector	Relationship between costs and outcomes better understood	Statistical data on sector's performance	
Results	Facilities are more fully used. Resources are applied equitably and effectively. Per capita costs reduce.	Spare capacity eliminated. Relevant data is available. Number of uneconomic groups reduced		
Overall objective: Improve quality	Intervention Logic	Indicators	Sources of verification	Risks and Assumptions
	1. Improve the outputs of tertiary education	<ul style="list-style-type: none"> • Pass-rates improve (5%pa), drop-out rates decline (5%pa), destinations (university or 	Student tracking data	<p>Economic recession may affect employment prospects</p> <p>Financial hardship may</p>

	<p>2. Strengthen management capacity to implement reform</p> <p>3. Upgrade qualifications and skills of teachers</p> <p>4. Achieve accredited kitemark for quality assurances eg ISO</p> <p>5. Develop an accreditation system for tertiary institutions to ensure acceptable standards of teaching/learning</p> <p>6. Improve institutions' resource-base</p>	<p>employment) are achieved</p> <ul style="list-style-type: none"> Managers identified and trained All teachers and professional staff gain professional qualifications Teachers of technical subjects undertake programme of updating of skills Quality assurance systems introduced, covering institution's administrative functions Institutions and courses are inspected and approved (public institutions within 2 years, private within 3) Libraries, workshops and laboratories are upgraded and restocked. A rolling programme is established 	<p>Course/training records, qualifications achieved</p> <p>Training records; personnel files</p> <p>Accreditation awarded eg ISO</p> <p>National Accreditation Council records</p> <p>Inspectors' reports</p>	<p>impede student progression</p>
Project purpose	To achieve improved outputs from the sector by	A culture of continuous quality improvement is	Data base information, training	

	raising overall quality standards	established	records, accreditation reports	
Results	Examination results improve; public confidence increases	Employers are satisfied with quality of graduates; quality of teachers recruited to tertiary institutions improves	Surveys Applications	

b) Overview of Policy Measures and Indicators for the Non-University Tertiary Sector Programme

NB- Adapted from GORTT Policy Paper on Tertiary Education Development and Draft FP, to be finally agreed upon with MSSTE imminently.

The review and monitoring process will be based on a common set of indicators within the framework of the FA. The first set will be agreed upon during the first review planned for XXX. It is therefore not possible now to include a final list of indicators or to quantify the indicators. Indicators used for the period of the first contribution will be output and process indicators.

Possible output indicators include:

- Number of students enrolled at tertiary level
- Proportion of tertiary enrolments in non-university sector
- Number of dropouts at tertiary level
- Number of enrolments in science and technology courses
- Percentage of tertiary level teachers qualified
- Graduates employment rates

Process indicators include:

- Plans for improved teacher training and upgrading
- Quality assurance systems introduced
- Establish a management and governance tertiary education structure
- Develop Annual Performance reports on Tertiary Education sector
- Design Institutional programmes in remedial education for transition into tertiary education

1. Policy goal: Restructuring the System

POLICY MEASURES	OUTCOME INDICATORS
<p>1. Development of Policy and Operational Framework</p> <p>2. Emphasise Teacher Training in Tertiary Sector Reform – review the current legal and jurisdictional oversight for teacher training under the MoE with a view to giving effect to the accord reached by the MSTTE on the tertiary education status of teacher education.</p> <p>3. Develop Policies to Support System Integration and Quality Assurance – Establish the Accreditation Council of T&T (ACTT), a national accreditation, quality assurance and equivalency agency within the framework of the regional accreditation initiative. Agency will be a key instrument in the development of quality tertiary education and play a key role in facilitating QA and accountability mechanisms across the sector.</p> <p>4. Implement Mechanisms to Forge Strategic Partnerships – Create a strong tertiary education culture of learning and training among all the parties concerned – government, social partners, enterprises and civil society.</p>	<p>Draft legislation to govern tertiary education and training in the form of a Tertiary Education Act as distinct from the Education Act, Accreditation Council Act, STI Council Act and Skills Act.</p> <p>Rationalised teacher training from pre-school to tertiary level in T&T as defined by an inter-ministerial team.</p> <p>A National Policy on teacher education and training within context of a Seamless Education and Training System as recommended by a Task force on Teacher Education and training.</p> <p>A fully operational ACTT with established local and regional linkages.</p> <p>Registration of approved national qualifications through a joint effort between the MSTTE, the ACTT and the National Training Agency (NTA).</p> <p>Establish technical co-operation plans with international governments and agencies in tertiary education by MSTTE.</p> <p>Establishment of a National Tertiary Education Council supported technically and administratively by MSTTE</p> <p>National Tertiary Education and Training Fund implemented by the MSTTE.</p>

2. Policy Goal: Widening Access/ Raise Participation Rate

POLICY MEASURES	OUTCOME INDICATORS
<p>1. Levelling of Tertiary Opportunities Arising from Inequities in Secondary Education</p> <p>2. Develop and Promote New Delivery Modes for a Changing Student Population</p> <p>3. Support for Greater Inclusion – Identify and analyse factors affecting gender differentials in rates of re-entry into the educational system, which includes pre-tertiary qualification and matriculation requirements and gender attitudes to continuing education.</p> <p>Expand and upgrade current technical/vocational education and training offerings to reflect the move towards the development of a more knowledge-based, innovative and entrepreneurial society.</p> <p>Introduce teaching and learning strategies for addressing the needs of students with learning difficulties at all levels of the education system.</p>	<p>Establishment of a quality assurance & accreditation system for primary and secondary schools between ACTT and MOE.</p> <p>Rationalised co-operative agenda established between MSTTE, NTA and MOE</p> <p>Establish a National Tertiary Education Council to govern tertiary education access, inter alia, supported by MSTTE.</p> <p>Establishment of the ‘Widening Tertiary Education Access Programme’ as a capacity building programme to bridge the divide towards participation in tertiary education and broaden the scope of educational programmes accessible to students in the tertiary education system facilitated by MSTTE.</p> <p>Demographic study analysing gender differentials between secondary and tertiary education to link to similar CARICOM study conducted by MSTTE.</p> <p>Curriculum reform in TVET to reflect social and labour trends and demands in T&T and region coordinated by MSTTE and NTA.</p> <p>Consultation on, and preparation of, a National Plan for improving educational opportunities for the differently abled.</p>

3. Policy Goal: Reforming the Curriculum

POLICY MEASURES	OUTCOME INDICATORS
<p>1. Develop Curricula Relevant to Workplace Requirements</p> <p>2. Improve Lack of Sufficient Academic Preparation, Basic Education and Core Links – Implement the Seamless Education System to critically address desired secondary education outputs that affect the tertiary education system.</p> <p>3. Greater Emphasis placed on Science and Technology</p>	<p>Quarterly labour market trends for country facilitated by NTA</p> <p>National Accreditation System having functional quality circles within tertiary level institutions coordinated by ACTT.</p> <p>Institutional programmes in remedial education for transition into tertiary education organised by MSTTE.</p> <p>10% year on year increase in enrolments in science and technology courses.</p> <p>MSTTE Strategic Plan showing harmonised policy goals for both STI and tertiary education.</p> <p>Reviewed NIHERST operational framework and established policy, legislation and operational framework for National Council for STI coordinated by MSTTE.</p> <p>Reformed tertiary level curricula in social studies, humanities and business studies to include subjects in basic and applied sciences and technology facilitated by MSTTE.</p>

4. Policy Goal: Financing the System

POLICY MEASURES	OUTCOME INDICATORS
<p>1. Identify and Improve Public Sector Resource Allocation Requirements</p> <p>2. Further identify sources and roles of funding</p>	<p>National Council for Tertiary Education established as official steering group to advise the Minister on medium to long term resource allocation, inter alia, for tertiary education sector.</p> <p>Tri-annual Strategic Plan for Tertiary Education Sector focusing on systems and institutional development goals developed and to be implemented by MSTTE.</p> <p>National Funding Policy for tertiary education (requirements set by National Council for Tertiary Education), policy developed and administered by MSTTE.</p> <p>Revised mechanism for PSIP allocation, monitoring and evaluation by MSTTE.</p> <p>Reward and Incentive Policy Programme for innovations in tertiary education practice coordinated by MSTTE.</p>

5. Policy Goal: Managing the System

POLICY MEASURES	OUTCOME INDICATORS
<p>1. Management of Tertiary Education – Establish a management and governance structure to increase system efficiency and effectiveness and promote greater accountability and transparency.</p> <p>2. Develop a Research Agenda</p> <p>3. Implement a Clearly Defined Performance Based Management System</p>	<p>Established National Council for Tertiary Education to report to Minister and work closely with MSTTE.</p> <p>Annual Performance Reports on Tertiary Education Sector with research data produced and report prepared by MSTTE</p> <p>Tertiary Education Performance Management System to assess, monitor and benchmark institutional performance developed by MSTTE and evaluation conducted by independent performance management agency.</p>

ANNEX I Intervention Frameworks

c) For the Non-focal sector (Health/HIV-AIDS)

		PERFORMANCE INDICATORS	SOURCES OF VERIFICATION	ASSUMPTIONS
OBJECTIVE				
	<p>(a) contribute to reduce the incidence of HIV</p> <p>(b) to mitigate the negative impact of HIV/AIDS on persons infected and affected in T&T</p>	<ul style="list-style-type: none"> ○ Decreasing number of deaths due to AIDS ○ Decreasing the percentage of children that have lost either their mother, or father or both parents ○ Decreasing the incidence rate ○ Enactment of legislation and workplace policies to prevent HIV/AIDS discrimination ○ Amelioration of public attitude against PLWHA ○ Reduction in human rights abuses against PLWHA 	<ul style="list-style-type: none"> ● Baseline ● Programme monitoring ● Surveys 	<ul style="list-style-type: none"> ● Government and other major stakeholders remain committed to prevention ● financial resources are available as required by the NSP both from national and donor funding ● the national bodies in charge are all mobilized and act within the provisions made by the NSP
PROJECT PURPOSES				
I	<p>Prevention of the spread of HIV/AIDS: involve communities in identifying ways to prevent sexual transmission of HIV and to reject major misconceptions about it.</p>	<ul style="list-style-type: none"> ○ Increased percentage of population who both correctly identify ways of preventing the sexual transmission of HIV and who reject major misconceptions about HIV transmission. (90% by 2005 and 95% by 2007) ○ At least 50% increase in number of young people aged 15-24 reporting the use of a condom during sexual intercourse with a non-regular partner ○ At least 75% increase in the proportion of CSW and MSM reporting use of condoms in last sex experience and in all sex experiences with non regular sex partners in a week's recall period ○ A 50% reduction in the reported HIV incidence rate among prisoners and substance abusers ○ A 50% increase in the amount of HIV free babies born to HIV infected mothers 	<ul style="list-style-type: none"> ● Baseline ● Programme monitoring ● Surveys ● Studies 	<ul style="list-style-type: none"> ● financial resources are available as required by the NSP both from national and donor funding ● the national bodies in charge are all mobilized and act within the provisions made by the NSP ● pharmaceuticals procured and distributed according to WB cost estimates and in line with recent WTO indications ● staff properly attracted and trained in technical and ethical aspects of HIV/AIDS prevention and treatment
II	<p>Treatment, care and support; strengthening the existing delivery system through decentralised and integrated service provision for HIV/AIDS.</p>	<ul style="list-style-type: none"> ○ At least 40% of the 15-49 aged population accessing VCT services at the end of 2007 ○ An increase in the number of persons presenting themselves for early HIV/AIDS treatment at health facilities ○ An increase in the number of persons presenting themselves for early HIV/AIDS treatment at health facilities ○ A 90% increase in the proportion of health facilities reporting adequate availability of drugs for 	<ul style="list-style-type: none"> ● Surveys 	<ul style="list-style-type: none"> ● staff deployed and supported at all the health institutions as required ● health institutions and community services fully equipped, staffed and physically updated ● PLWHA are empowered, business sector is fully

		PERFORMANCE INDICATORS	SOURCES OF VERIFICATION	ASSUMPTIONS
		<p>Post Exposure Prophylaxis for health personnel in both the public and private personnel in both the public and private sectors</p> <ul style="list-style-type: none"> ○ At least a 60% increase in the amount of CSTI cases reported, counselled, managed and monitored ○ At least 6 000 PLWHA receiving free ARV therapy and HIV/AIDS care over the period 2003-2007 at identified treatment centres ○ Quality reporting system for care of HIV patients fully established and operational ○ At least 50% increase in the number of health practitioners trained in HIV/AIDS treatment and care at primary, secondary and tertiary levels ○ At least 90% increase in the number of health facilities with adequate availability of drugs for treating Opportunistic Infections 		<p>integrated in the delivery system, NGOs participate fully in the national effort</p> <ul style="list-style-type: none"> • media, communities, educational and productive sectors are mobilized to mitigate stigma and discrimination in all aspects of daily life • appropriate research supported and results adopted into the decision-making process.
III	Advocacy and Human Rights: to guarantee human rights by tackling all forms of stigma and discrimination, particularly that suffered by the most vulnerable groups	<ul style="list-style-type: none"> ○ An increase in the number of HIV/AIDS service organisations with enhanced ability to respond to the needs of their clients ○ A referral system between HIV/AIDS service organizations, public and non-governmental organizations for the provision of social support fully developed and operational ○ At least 75% of PLWHA and 50% of persons affected by HIV/AIDS receive supportive counselling. ○ At least 50% reductions in the number of cases of human rights abuses against PLWHA ○ At least a 90% increase in the proportion of health care providers with positive attitudes towards HIV positive persons ○ At least 50% of the general population having an accepting attitude towards HIV + persons ○ At least 50% of all public and private sector organizations have implemented workplace policies ○ Enactment of legislation to prevent HIV/AIDS discrimination ○ Enactment of legislation to prevent human rights abuses against PLWHA and other groups affected by HIV/AIDS 	<ul style="list-style-type: none"> • Surveys • Programme monitoring • Reviews 	
IV	Programme management, Coordination and Evaluation: to support NACC, the	<ul style="list-style-type: none"> ○ Enactment of legislation for the operationalising of the NACC ○ Annual budgetary allocation to the NACC from 2003 ○ Individual sectors developing and 	<ul style="list-style-type: none"> • Programme progress reports 	

	PERFORMANCE INDICATORS	SOURCES OF VERIFICATION	ASSUMPTIONS
	<p>NACC Secretariat and the HIV/AIDS Substance Abuse Commission in the Tobago House of Assembly (THA)</p>	<p>implementing sector specific HIV/AIDS work plans</p> <ul style="list-style-type: none"> ○ Development of NSP monitoring indicators ○ Annual evaluation reports delivered to the national community ○ All members of NACC fully trained to perform their functions effectively and efficiently ○ Critical sectors empowered to effectively administer programmes and activities at the level of the community ○ Capacity established at NACC for coordinated Human Resource Development ○ Ongoing training provided to community based stakeholders 	
V	<p>Implementation of the Tobago response: the aim is to strengthen the multipurpose Health promotion clinic enabling it to deliver a set of comprehensive services to PLWHA and to the general and at risk population.</p>	<ul style="list-style-type: none"> ○ Number of public facilities that provide diagnosis, counselling and treatment of STIs according to national guidelines ○ Increasing the percentage of antenatal clinics offering or referring for VCT ○ Increase in the number of public facilities that are staffed by trained counsellors providing specialised HIV counselling and testing ○ A 50% increase in the amount of HIV-free babies born to HIV infected mothers ○ Decreasing the HIV prevalence rate among pregnant women ○ Decreasing the HIV incidence rate to 30% of its 2003 value at the end of 2007 ○ Increasing the percentage of individuals who have ever voluntarily requested an HIV test, received the test, and received their results. ○ Increase in the number of individuals who request counselling on HIV testing at a VCT centre. ○ At least 40% of the 15-49 aged population accessing VCT services at the end of 2007 ○ Increasing the percentage of post HIV test counselling sessions at voluntary counselling and testing facilities that meet international standards for quality counselling ○ Increasing the percentage of clients served by VCT services that meet minimum conditions necessary to provide quality counselling and HIV testing services ○ Increasing the percentage of HIV tests requested by voluntary counselling and testing centers 	<ul style="list-style-type: none"> ● Baseline ● Programme monitoring ● Surveys ● Studies

PERFORMANCE INDICATORS		SOURCES OF VERIFICATION	ASSUMPTIONS
	<p>over a one-month period which follow recommended testing algorithms.</p> <ul style="list-style-type: none"> ○ Number of STI case reported from facilities that provide STI services according to national guidelines ○ Increase in the number of NGOs and CBOs engaged in the response to the HIV/AIDS epidemic that received financial or technical support within the national strategic plan in the last 12 months 		

ANNEX II. Chronogramme -- Schedule of Preparation and Implementation Phases of EDF Projects and Activities for the Period 2004 - 2007

	Projects	2004		2005		2006		2007	
		1	2	1	2	1	2	1	2
1	Caribbean Business Services Ltd – Phase II	I	I	I	I	I			
2	Poverty Reduction Programme	I	I	I	I	I	I	I	
3	Rural Electrification Programme – Phase II	P	I	I	I	I	I	I	I
4	Institutional Strengthening of the office of the NAO	I	I	I					
5	Tertiary Education Preparatory study	I	I						
Ninth EDF Activities									
6	TCF for Trinidad and Tobago		P/I	I	I	I	I	I	I
7	Support to the NSP on HIV/AIDS Programme	P	P	I	I	I	I	I	I
8	FP for Support to the non University Tertiary Sector - FP to be sent to BXL via Guyana end 04/05 or start 05/05		P	P	I	I	I	I	I

- P - Preparatory Phase
- I - Implementation Phase
- P/I - Preparatory and Implementation activities both occur within a six month period

ANNEX III. Forecast of commitments and disbursements 2005-2006
(in €uros, millions)

N°	Title	Total prim.com.	situation 31/12/2004		1° semester 2005		2° semester 2005		Total 2005		1° semester 2006		2° semester 2006		Total 2006		Situation 31/12/2006	
			Total sec.com. (A)	Total paid (B)	sec.com. (C)	payments (D)	sec.com. (E)	payments (F)	sec.com. (C+E) (G)	payments (D+F) (H)	sec.com. (I)	payments (J)	sec.com. (K)	payments (L)	sec.com. (I+K) (M)	payments (J+L) (N)	Total sec.com. (A+G+M)	Total paid (B+H+N)
(6, 7 & 8th EDF)																		
8 TR 8	Poverty Reduction *	6.000	3.484	0.542	0.000	5.297	0.128	0.577	0.128	5.874	2.8	1.273	0.00	1.238	2.8	2.51	6.412	8.924
8 TR 5 and 11	Tobago Management Plan	0.252	0.247	0.242	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.247	0.242
8 TR 12	TA to NAO	0.576	0.540	0.238	0.000	0.008	0.000	0.000	0.000	0.008	0.000	0.000	0.000	0.000	0.000	0.000	0.540	0.246
8 TR 14	Support to CBSL II	1.982	1.727	0.476	0.000	0.100	0.000	0.553	0.000	0.653	0.2	0.075	0.000	0.075	0.2	0.15	1.927	1.279
8 TR 15	Identification study education for 9th EDF	0.270	0.270	0.257	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.270	0.257
8 TR 16	Identification study health (HIV/AIDS) for 9th EDF	0.100	0.080	0.020	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.080	0.020
Total 6,7and 8 EDF		9.180	6.348	1.775	0.000	5.405	0.128	1.130	0.128	6.535	3.00	1.348	0.000	1.313	3.00	68	9.476	10.97

N°	Title	Total prim.com.	situation 31/12/2004		1° semester 2005		2° semester 2005		Total 2005		1° semester 2006		2° semester 2006		Total 2006		Situation 31/12/2006	
			Total sec.com. (A)	Total paid (B)	sec.com. (C)	payments (D)	sec.com. (E)	payments (F)	sec.com. (C+E) (G)	payments (D+F) (H)	sec.com. (I)	payments (J)	sec.com. (K)	payments (L)	sec.com. (I+K) (M)	payments (J+L) (N)	Total sec.com. (A+G+M)	Total paid (B+H+N)
(9th EDF)																		
9 ACP TR 1	Rural Electrification II	1.850			0.089	0.089	0	0	0.089	0.089	1.35	0.135	0	0.270	1.35	0.405	1.440	0.494
9 ACP TR4?	Support to post-secondary education	27.300					FP to HQ(May) FP to EDF (Sept)	0	0	0	0.25	0.125	0.5	0.25	0.75	0.375	0.75	0.375
9 ACP TR 3	Support to HIV/AIDS	7.130			0	0	0.125	0.075	0.125	0.075	0.25	0.15	0.25	0.15	0.5	0.3	0.625	0.375
9 ACP TR 2	TCF	1.000			0.13	0.062	0	0.065	0.13	0.127	0.13	0.065	0	0.065	0.13	0.13	0.26	0.257
Total 9 EDF		37.2800			0.219	0.151	0.125	0.14	0.344	0.291	1.98	0.475	0.75	0.735	2.73	1.21	3.075	1.501

Total 6,7,8and 9 EDF		46.461	6.348	1.775	0.219	5.556	0.253	1.27	0.472	6.826	4.98	1.823	0.75	2.048	5.73	3.87	12.551	12.471
-----------------------------	--	---------------	-------	-------	-------	-------	-------	------	-------	-------	------	-------	------	-------	------	------	---------------	---------------

ANNEX IV - TRINIDAD AND TOBAGO: DONOR MATRIX 2003
NB – Awaiting donor matrix for 2004 from NAO

Group & Sector	Project Name	Estimated Total Cost Of Project TT\$M	Year Started	Financing	Projected Expend 2003 TT\$M	Projected Gov't Funding Reqmts 2003	Projected Loan Drawdowns 2003 TT\$M	Details Of Activity 2003
ECONOMIC INFRASTRUCTURE								
Agriculture, Fisheries, Forestry	Agriculture Sector Technical Assistance Programme	69.30	1996	IDB Loan - US\$9.0 Mn; GORTT- US\$2.0 Mn	4.00	1.20	2.8	Implementation of a cadastral records management system for land administration and completion of technical assistance in agri-business to review existing studies and proposals, address issues affecting the sector and to advise private businesses on the identification of market opportunities.
<u>Manufacturing</u>	Accreditation of Laboratories	5.32	2003	IDB/MIF - US\$0.500 Mn GORTT - US\$0.344 Mn	0.300	0.189	0.111	Commencement of development of a database, national expertise and promotional material in the areas of conformity assessment and accreditation, and international quality management systems by TTBS.
<u>Environment</u>	Establishment of a National Parks and Wildlife Authority	103.95	2002	GEF Grant - US\$4.2Mn; IBRD - US\$8.2 Mn; (To be arranged) GORTT - US\$4.1 Mn	2.00	2.00	0.00	Establishment of a National Parks and Wildlife Unit and development of the infrastructure necessary for Trinidad and Tobago to establish three 'model' national parks and a modern wildlife conservation programme.
<u>Roads and Bridges</u>	National Highway Programme	1,935.55	1996	IDB Loan - US\$120.0 Mn; JSFGrant - US\$0.68 Mn; IDB Grant - US\$0.15 Mn; GORTT - US\$ 186.4 Mn	72.00	6.80	65.20	Commencement of construction of 75 km of Year 2 roads; completion of designs for 120 km of Yr 3 roads and 40 bridges inclusive of Tobago; continued stabilisation of failed slopes in north and central Trinidad continuation of consultancies for the re-organisation of the Road Administration and HDM IV training
	Southern Roads Development Programme	420.21	1995	CDB Loan - US\$35.0 Mn; GORTT- US\$31.7 Mn	3.96	0.79	3.17	Completion of 4.2 km of a dual carriageway to extend the Solomon Hochoy Highway from St. Joseph Village to Ciperio Road.
<u>Tourism</u>	Tourism Action Programme	43.0	1995	IDB Loan -US\$5.0 Mn; GoRTT- US\$1.821 Mn; Can TAP Grant-US\$0.35 Mn	4.3	0.2	4.1	Commencement of study on siting of an Ocean Outfall and development of a Shoreline Plan for the North Coast; commencement of construction of a sand barrier and campsite at Maracas Beach; and continuation of the beautification of the Scarborough Waterfront.

Group & Sector	Project Name	Estimated Total Cost Of Project TT\$M	Year Started	Financing	Projected Expend 2003 TT\$M	Projected Gov't Funding Reqmts 2003	Projected Loan Drawdowns 2003 TT\$M	Details Of Activity 2003
<u>Transport and Communication</u>	Postal Sector Reform Project	93.56	1998	IBRD Loan - US\$11.45 Mn; GORTT - US\$3.4Mn	10.00	1.50	8.50	Continuation of modernisation and rehabilitation of Post Offices; acquisition of vehicles, computers and equipment and provision of technical assistance.
	Strengthening of Aviation Security	4.51	2003	IDB/MIF Grant - US\$0.5 Mn GORTT - US\$0.215 Mn	1.38	0.41	0.96	Strengthening of regulations and procedures for aviation security; implementation of new administrative procedures; and conduct of training programmes in new security procedures which have been adopted in the airline industry.
<u>Other Economic Services</u>	Support to Caribbean Business Services Limited	11.40	1998	EU Grant - Euro 1.9 Mn	0.745	0.445	0.30	Commencement of Phase II of the programme of demand-driven technical support to the Small and Medium Enterprises (SME) sector in wood and related products, food processing, textiles/garments and footwear, mining and quarrying by way of management and marketing advice and transfer of technology
	Credit Union Strengthening Project	11.27	1999	IDB Grant - US\$1.066 Mn; GORTT - US\$0.722 Mn	1.00	0.250	0.750	Completion of draft legislation for Credit Union Act and development of MIS for supervision of Credit Unions.
	Establishment of Regulated Industries Commission	34.1	1999	IDB Grant – US\$5.418 Mn	1.212	0.00	1.212	Completion of a legal and regulatory framework for the electricity sector.
	Establishment of Small Business Leasing Company	20.00	2000	People's Republic of China –Loan TT\$20.0 Mn	7.00	0.00	7.00	Acquisition of equipment and machinery by the Small Business Leasing Company Limited for leasing to Small Business.
	Establishment of Legal/Institutional Framework for secured transactions in Moveable Property	7.465	2001	IDB Grant –US\$0.65 Mn; Private sector – US\$0.487 Mn; GoRTT -\$0.480 Mn.	0.200	0.200	0.000	Procuring of consultancy services for drafting secured transactions legislation and creation of a Registry.
	Trade Sector Support Programme	44.73	2003	IDB Loan - US\$5.0 mn GORTT - US\$2.1 MN	0.500	0.150	0.350	Establishment of PCU and the commencement of institutional reorganisation of the Ministry of Trade and Industry, provision of specialized technical training, trade assistance programme and commencement of technical studies.
SOCIAL INFRASTRUCTURE								

Group & Sector	Project Name	Estimated Total Cost Of Project TT\$M	Year Started	Financing	Projected Expend 2003 TT\$M	Projected Gov't Funding Reqmts 2003	Projected Loan Drawdowns 2003 TT\$M	Details Of Activity 2003
<u>Education</u>	IBRD Fourth Education Programme	494.11	1995	IBRD Loan - US\$51.0 Mn; GORTT- US\$27.43 Mn.	92.035	32.212	59.823	Completion of construction of 7 primary schools, 2 secondary schools and 10 ECCE Centres; commencement of construction of 6 primary schools and an addition for Primary Schools Principals and ECCE teachers; purchase of furniture, equipment, library books and textbooks, implementation of SIPs; and continuation of technical reforms within the Ministry of Education.
	Secondary Education Modernisation Programme	945.00	1998	IDB Loan - US\$105.0 Mn; GORTT - US\$45.0 Mn	14.20	4.260	9.940	Continuation of projects/programmes in the areas of curriculum development, teaching and learning strategies, testing and assessment, professional development and institutional strengthening; upgrade of secondary schools to accommodate multimedia learning centres
<u>Health</u>	HIV/AIDS Prevention and Control Project	992.25	2003	IBRD: US\$126.0 Mn; GOTT:US\$31.5	0.00	0.00	0.00	Establishment and operation of a National AIDS Coordinating Committee, and strengthening the institutional capacity and operation of the Project Coordinating Unit.
	Health Sector Reform Programme	1,253.17	1991	IDB Grant -US\$5.19 Mn; IDB Loan - US\$134.0 Mn; GORTT- US\$59.725 Mn	80.95	16.19	64.76	Upgrade, construction and refurbishment works at general hospitals, district health facilities and health centres nationwide; commencement of construction of Tobago hospital and restructuring of the Regional Health Authorities (RHAs); development of information systems; and development of the Population Registry System.
<u>Housing and Settlements</u>	Second Settlements Programme	252.00	2002	IDB Loan -US\$32.0 Mn; GORTT- US\$8.0 Mn	34.626	6.925	27.701	Improving housing conditions for low-income groups; making public expenditure for housing more efficient and equitable; providing incentives and assisting institutions, both public and private.
<u>Social and Community Services</u>	Poverty Alleviation Programme	37.8	2001	EU Grant - Euro 6.0 Mn	3.2	0.00	3.20	Establishment of a micro-credit and a micro-project fund and creation of Regional Social and Human Development Councils (RSHDCs) including technical support.
	Community Development Fund Programme	240.00	1995	IDB Loan - US\$28.0 Mn; GORTT- US\$12.0 Mn	14.00	4.20	9.8	Continuation of funding for projects under the NCSHL, and projects under the NGO/CBO Grants Window Programme; implementation of 7 projects in the poorest communities under the IPI; training for young persons between 18 to 25 years under the CCC and YTEPP and for women under the Non-Traditional Skills Training Programme; and expansion of the ECCE programme

Group & Sector	Project Name	Estimated Total Cost Of Project TT\$M	Year Started	Financing	Projected Expend 2003 TT\$M	Projected Gov't Funding Reqmts 2003	Projected Loan Drawdowns 2003 TT\$M	Details Of Activity 2003
<u>Human Resource Development</u>	Establishment of the Trinidad and Tobago Institute of Technology (TTIT)	107.54	2000	CDB Loan - US\$7.54 Mn NESC - US\$5.03 Mn GORTT- US\$4.50 Mn	3.00	0.500	2.50	Completion of outfitting of the Trinidad and Tobago Institute of Technology (TTIT) at Brechin Castle, Couva.
	Development of a Master Plan for COSTAATT	6.30	2003	CDB - US\$1 Mn. GORTT- US\$0.305 Mn.	0.750	0.00	0.75	Commencement of the development of a Master Plan for COSTAATT including preparation of architectural drawings and designs for the St. Joseph campus
PUBLIC ADMINISTRATION								
PLANNING\PROJECT PROGRAMME DEVELOPMENT								
<u>Planning & Project Development</u>	Multi-Sectoral Pre-Investment Programme	90.00	1994	IDB Loan-US\$10.5 Mn; GoRTT – TT\$4.5 Mn	3.650	1.445	2.205	Completion of designs for 13 district/enhanced health facilities and the Sangre Grande and Point Fortin Hospitals.
	Pre-Investment Studies for 9th EDF Programmes	10.80	1997	EU Grant - Euro 1.8 Mn	1.800	0.00	1.800	Conduct of preparatory studies for projects to be funded under the 9 th EDF in the focal areas of health and education;
	Institutional Strengthening of the Ministry of Planning and Development	4.00	1996	EU Grant - Euro 0.544 Mn	0.80	0.00	0.80	Training of staff in the Ministry of Planning and Development and Ministries/Agencies involved in implementation of EDF Programmes; and outfitting of the EDF Unit.
					343.48	84.491	258.947	

ANNEX V: NIP of the 9th EDF - Financial Situation and Status Report of Projects funded (as at 31.12.04 in EUR)

Project No. 9 ACP TR	Project Title	Date Of EDF Decision	Allocated	Committed	Disbursed	Disbursed	Status
					To Jan 1, 04	To Dec. 31. 04	
1	Rural Electrification 2003	01/11/2003	1,850,000	0	0	0	FA signed June 2004
2	Technical Cooperation Fund (TCF)	30/6/2004	1,000,000	0	0	0	FA signed Nov 2004
3	Support to National Strategic plan for HIV/AIDS	1/1/2004	7,130,000	0	0	0	FA to be signed by GORTT
4?	Support to Post Secondary Education		27,300,000	0	0	0	FP to HQ in 2 nd semester 05
	Projects Total:		37,280,000	0	0	0	
	Total NIP		17,000,000				
	Balance on previous EDFs		25,895,438				
	Total funds available		42,895,438				
	Balance available for commitment		42,895,438				

ANNEX VI: NIP of the 8th EDF - Financial Situation and Status Report of Projects funded (as at 31.12.03 in EUR)

Project No.	Project Title	Date Of EDF Decision	Allocated	Committed	Disbursed To Jan 1, 04	Disbursed To Dec. 31. 04	Balance to decommit	Status
1	Support to Caribbean Business Services Ltd	28.08.97	484,441	482,887	482,887	482,887	1,554	Closed on 27/2/04
5	Tobago Management Plan (1)	09.04.99	220,000	220,000	209,183	209,183	10,817	Closed 24/3/04
6	Institutional Strengthening of the Office of NAO	16.08.99	140,216	131,919	125,193	125,193	15,023	Closed 18/6/04
7	Cocoa Logical Framework Workshop	28.09.00	40,000	39,638	23,233	23,233	16,767	Closed 28/3/03
8	Poverty Reduction Programme	16.12.00	6,000,000	3,484,148	481,760	542,315	0	On-going
11	Supplementary work for Tobago Management Plan[2]	29.04.02	32,000	27,100	4,900	25,973.20	6026.80	Closed 24/3/04
12	Institutional Strengthening of the Office of NAO (II)	30.05.02	576,200	540,500	186,555	237,507	0	On-going
14	Support to CBSL II	27.02.02	1,982,000	1,727,950	305,128	476,497	0	On-going
15	Feasibility study post-secondary education	24/03/2003	270,000	256,880	0	233,587.43	0	To be closed
16	Feasibility study HIV/AIDS	27/03/2003	100,000	79,695.47	22,489	79,695.47	20,304.53	To be closed. Closure requested 12/04
	Projects Total:		9,844,857	6,990,717.4	1,841,328	2,436,071	26,331.33	
	Balance on NIP		4,855,143	7,709,282.6	12,858,672	12,263,929		
	Total NIP		14,700,000					

Balance to transfer 7,735,613.9

[1] See also TR11

[2] See also TR5

ANNEX VII: NIP of the 7th EDF - Financial Situation and Status Report of Projects funded (as at 31.12.04 in EUR)

Project No 7 ACP TR	Project Title	Date of EDF Decision	Allocated	Committed	Disbursed To Jan 1, 04	Disbursed To Dec 31, 04	Balance to decommit	Status
3	Support to SAP I	04.05.93	1,686,521	1,686,521	1,686,521	1,686,521	0	Closed 1/10/96
4	TA to the NAO	01.07.93	167,716	167,716	167,716	167,716	0	Closed 11/5/98
17	Road Rehabilitation (Solomon Hochoy H/way) (1)	20.12.93	10,000,000	9,927,801	4,037,131	4,037,131	5,890,670	Closed 21/12/04
18	Rural electrification	23.02.94	1,982,253	1,982,253	1,982,253	1,982,253	0	Closed 27/6/02
19	Tender evaluation road rehabilitation study	10.03.94	9,860	9,860	9,860	9,860	0	Closed 1/10/96
21	Small Business Development Programme	22.09.94	2,000,000	1,276,416	1,276,416	1,276,416	0	To be closed. Brussels to effect closure, submitted 2/02
24	Yactrap	13.10.94	71,009	71,009	71,009	71,009	0	Closed 27/6/02
29	Support to SAP II	04.11.95	1,100,000	1,045,000	1,045,000	1,045,000	0	Closed 26/3/03
33	Training seminar on EDF procedures	22.07.96	12,943	12,943	12,943	12,943	0	Closed 11/5/98
36	L'Anse Fourmi- Charlotteville study and design	17.12.96	27,400	27,400	27,400	27,400	0	Closed 6/3/02
	Projects Total :		17,057,702	16,206,919	10,316,249	10,316,249	5,890,670	
	Balance on NIP		1,042,298	1,893,081	7,783,751	7,783,751		
	Total NIP :		18,100,000					

Balance to transfer 7,783,751

1) The balance on the 10,000,000 originally allocated for this commitment has since been decommitted to leave only the amount actually paid out after recovery of Euro 4,037,131.

ANNEX VIII: NIP of the 6th EDF - Financial Situation and Status Report of Projects funded (as at 31.12.04 in EUR)

Project No. 6 ACP TR	Project Title	Date of EDF Decision	Allocated	Committed	Disbursed	Disbursed	Balance to decommit	Status
					To Jan 1, 04	To Dec. 31, 04		
1	Macro Economic and Sectoral Planning Programme	11.10.88	6,005	6,005	6,005	6,005	0	Closed 2/4/92
2	Macro Economic and Sectoral Planning Programme	11.10.88	497,798	497,798	497,798	497,798	0	Closed 27/6/02
10	Tourism Development Programme	16.04.92	493,668	493,668	420,637	493,668	0	Closed 20/12/02
11	Appraisal Study Road Rehabilitation & Maintenance Project	04.03.93	85,114	85,114	85,114	85,114	0	Closed 1/10/96
12	Support to Structural Adjustment Programme	29.07.93	5,000,000	5,000,000	5,000,000	5,000,000	0	Closed 27/9/96
15	Training for NAO Staff	21.06.93	12,211	12,211	12,211	12,211	0	Closed 24/3/98
16	Road rehabilitation (special loan converted to grant)	20.12.93	6,000,000	0	0	0	0	Closed 19/9/03 decommitted
19	YACTRAP	16.05.95	2,182,495	720,665	720,665	720,665	0	Closed 6/8/03
20	L'Anse Fourmi - Charlotteville Feasibility & Design Study	20.12.96	2,900	2,900	2,900	2,900	0	Closed 6/3/02
21	Rural Electrification Phase II – Feasibility Study.	28.06.01	20,000	19,089	19,089	19,089	0	Closed 28/3/03
22	Small Business Development – Phase II – Feasibility Study	12.07.01	80,000	79,200	31,715	55,147	24,053	Brussels to process closure, submitted Feb 04
23	Cocoa Rehabilitation – Farm Systems Survey – Study.	19.07.01	78,500	78,040	78,040	78,040	0	Closed 28/3/03
24	Caribbean Business Services Phase II – Feasibility Study	16.08.01	78,000	20,385	20,385	20,385	0	Brussels to process closure, submitted Feb 04
	Projects total :		14,536,691	7,015,075	6,894,559	6,991,022	24,053	
	Balance on NIP :		463,309	7,984,925	8,105,441	8,008,978		
	Total NIP :		15,000,000			Total to transfer 8,008,978		

ANNEX IX: Regional Programmes Executed from Trinidad and Tobago: Financial Overview Dec 2004

Project No.	Project Title	Financing AGREEMENT/ DAG Signed	Allocated (Mn Euros)	Committed	Disbursed	Status
				To 31-Dec-04 (Mn Euros)	To 31-Dec-04 (Mn Euros)	
7 ACP RPR 385	Caribbean Agriculture & Fisheries Programme	03/23/1995	22.20	20.01	18.22	Ended 09/04 – closure underway
7 ACP RPR 759	Caribbean Telecommunications Union Programme	12/01/1999	0.75	0.64	0.64	Closure requested 3/05
8 ACP RCA 020	Strengthening of Medical Laboratories	08/05/2000	7.50	7.33	2.64	On going
8 ACP RCA 001	Caribbean Regional Anti-Money Laundering Programme	09/22/1998	4.00	3.99	3.66	Ended 12/04 Closure underway
8 ACP RCA 013	Drug Epidemiological Surveillance Programme	01/10/2000	1.29	1.16	0.88	Justifications pending for two commitments
9 ACP RCA 1	Regional Radar project	17/7/03	13.20	0	0	Ongoing. PMU contract to be signed
9 ACP RCA 6	SEMA contract to update Radar tenders	15/12/03	0.085	0.060	0	Ongoing. Started February 2004
	TOTAL		49.03	33.19	26.04	

Annex X: EIB projects

Risk capital operation							
Convention	Sign. Date	Contract name	First Reimb.	Last Reimb.	Amount signed	Amount disbursed	
LOME - CONVENTION 3	12/20/1989	TTDFC V PROJECT A			390,529.66	247,204.34	
LOME - CONVENTION 3	12/20/1989	TTDFC V PROJECT C	9/25/2010	9/25/2014	2,500,000.00	1,291,867.69	
LOME - CONVENTION 4	9/2/1994	DFL - SHARE SUBSCRIPTION			74,843.12	66,745.17	
LOME - CONVENTION 4	9/2/1994	DFL VI GLOBAL LOAN	8/20/2009	8/20/2009	4,000,000.00	2,895,294.15	
LOME - CONVENTION 4 - PROT.2	9/21/1998	DFL GL VII	6/30/2013	6/30/2013	2,000,000.00	2,000,000.00	
LOME - CONVENTION 4	7/28/1999	CARIBBEAN MICRO-FINANCE FEASIBILITY ST	7/5/2014	7/5/2014	250,000.00	250,000.00	
LOME - CONVENTION 4	6/17/2002	DFL VIII	6/10/2017	6/10/2017	6,000,000.00	1,801,724.08	
					15,215,372.78	8,552,835.43	
Special loans (under Commission's mandate)							
Convention	Sign. Date	Contract name	First Reimb.	Last Reimb.	Amount signed	Amount disbursed	
LOME - CONVENTION 1	1/11/1979	FISHERIES ST. PATRICK	7/15/1998	1/15/2028	570,000.00	140,395.15	
LOME - CONVENTION 1	1/11/1979	PRODUCTION OF TIMBER	9/1/1988	3/1/2018	1,020,000.00	183,384.11	
LOME - CONVENTION 2	7/4/1983	CREDIT TO SCALE AGRIC.PROJECT	12/1/1993	6/1/2023	1,500,000.00	1,049,099.97	
LOME - CONVENTION 2	3/27/1984	REGIONAL MARKETING OF AGR.	9/15/1994	3/15/2024	1,450,000.00	578,217.73	
LOME - CONVENTION 1	4/2/1984	TRADE PROMOTION PROGRAMME	9/1/1994	3/1/2024	700,000.00	3,158.69	
LOME - CONVENTION 1	5/4/1984	LAMBEAU HILL WATER SUPPLY	10/1/1994	4/1/2024	600,000.00	310,157.05	
LOME - CONVENTION 2	2/18/1987	CREDIT SM AGRIC.MEDIUM SCALE	6/15/1997	12/15/2026	1,500,000.00	705,658.50	
LOME - CONVENTION 1	12/27/1990	ST. PATRICK WATER SUPPLY	3/1/2001	9/1/2030	5,500,000.00	4,776,749.98	
LOME - CONVENTION 3	12/27/1990	ST. PATRICK WATER SUPPLY	3/1/2001	9/1/2030	768,665.00	206,269.36	
					13,608,665.00	7,953,090.54	
Own resources loans							
Convention	Sign. Date	Contract name	First Reimb.	Last Reimb.	Amount signed	Amount disbursed	
LOME - CONVENTION 4	12/12/1991	TRINTOC OIL REFINERY	6/5/1996	12/5/2006	38,000,000.00	8,993,983.47	
LOME - CONVENTION 4	4/7/1994	MTBE	10/5/1997	4/5/2009	8,500,000.00	1,926,762.99	
LOME - CONVENTION 4	12/11/1996	GAS PIPELINE	6/10/2000	12/10/2008	45,000,000.00	18,325,285.84	
LOME - CONVENTION 4 - PROT.2	9/21/1998	DFL GL VII	12/31/2002	6/30/2013	8,000,000.00	5,055,473.83	
					99,500,000.00	34,301,506.13	
Grand total					128,324,037.78	50,807,432.10	

Annex XI: Use of budgetary support/counterpart funds

(NOT APPLICABLE)

Annex XII: Project profiles:

a) National projects

PROJECT PROFILE

Unit: AIDCO/C/ 4

AIDCO Contact: Gaetano Viti
Project Manager: Gary Tagallie
Programme Officer: Terhi Karvinen

1. Title of project: **POVERTY REDUCTION PROGRAMME**

2. Project number: **8 ACP TR 8**

3. Basic administrative data

Type of project	SOCIAL/WELFARE SERVICES
Country	Trinidad and Tobago
Signature of the FA	August 2001
Start date	31-October-2001
Implementation deadline	30-June-2007
Operational duration	33 months
Convention budget:	
➤ TOTAL	6,000,000
➤ EU	6,000,000
➤ Private sector/National counterpart	

4. Project description

- This project has 1 main purpose:
 1. To support the Government of Trinidad and Tobago in formulating and implementing a National Poverty Reduction Strategy that is more responsive to the needs of the most vulnerable groups of the population. The support to the implementation of the decentralisation of the delivery system for social services as agreed by the Cabinet will be carried out without creating any new implementation agency.
- The expected results are:
 1. Improvement of the delivery of poverty reduction services
 2. Strengthening of the institutional framework for poverty reduction
 3. Strengthening of the information system on poverty and poverty reduction programmes

These results will be achieved through the following activities:

- **Result 1:** Establishment of a microproject fund administered through Regional Social and Human Development Councils (RSHDCs) (EUR2million); establishment of a microcredit fund (EUR750,000) and; setting up a network of information and resource centres

- **Result 2:** Strengthen the **Change Management Unit (CMU)** within the Ministry of Social Services Delivery, Office of the Prime Minister; create and technically support RSHDCs; conduct a regular review of government budget and investment programmes for their “poverty content and orientation”.
- **Result 3:** Improve the availability of and access to information on poverty through assistance in creation of a **databank** on poverty with the Central Statistical Office (CSO); undertake regular national and regional poverty analyses using the above databank and the staff and resources of the CMU; improve the availability and access to information on poverty reduction programmes and partnerships through establishment of a web hub with connections to the RSHDCs.

Budget:

	In €
Technical assistance	
• Foreign experts	178.200
• Local experts	1.395.000
Seminars, workshops, publication and travels	670.500
Equipment	480.000
Funds	
• Micro-project facility	2.000.000
• Micro-credit facility	800.000
Total activities	5.523.7000
Evaluation	200.000
Contingencies	276.300
Total programme	6.000.000

5. Monitoring

In 2004 the project made real progress in a number of fields, in general with very positive results. The Change Management Unit has been transformed into a Programme Management Unit (PMU), which has much more flexibility in operations, and located directly in the Office of the Prime Minister. After an interruption in 2003 the original project manager is now full-time on board, senior project officers are in place and trained, administrative staff and accountant are operational and a number of regional counsellors are trained and working. Installation of the first RSHDCs has taken place and the full contingent of 15 councils will have started their work by the end of March 2005. Training of and support to the members of the councils has started and will stimulate self-motivation, awareness and sustainability. An active programme of Regional Consultations for the Establishment of a Network of Civil Society Organisations was launched in 2004 and will proceed till the end of 03/05.

A study and design on the Micro Project Fund (MPF) has been approved, training of local councils and Project Implementation Unit (PIU) staff started and first application forms will be reviewed in early 2005. A report on the Micro Credit Fund (MCF) has been completed and is now in the consultative process with GORTT through the NAO, other line ministries and

the PMU. The consultant suggested the involvement of a credit union, a small but well run rural micro-credit organisation and microfin, a well established financial operation that already works with the EIB. However, a recent monitoring mission suggested using just two.

The tender process for the selection of consultants to execute the poverty audit is in progress, and a full audit is scheduled to begin in mid 2005. Review of GORTT budget and Investment Plan for Social Security will take place at the same time, so that a good round of discussions on the GORTT's policy and strategy on poverty reduction can take place during the second half of 2005. Finally, work on the tender dossier for the structure of a database on poverty and poverty reduction programmes in the country is in progress and will result in tendering for consultants most likely during the first quarter of 2005.

6. Problems and envisaged solutions

The project was extremely slow to start with the Ministry attempting to negotiate wide ranging changes after FA signature. This process was overruled by the Attorney General and the original FA was adhered to.

Despite the slow start a lot has been achieved during the past year. Many activities have started and some good results can be noted, e.g. establishment of the first two batches of RSHDCs; establishment of a Network of Regional CSOs with many more in the process of being organised; regular and committed training of the participants in RSHDC and CSO, and appointment and training of dedicated staff within the PMU, and regional staff in the PIUs. Studies on Micro Project Fund (MPF) and Micro Credit Fund (MCF) are completed, and both instruments will start implementation in the beginning of 2005. Results seem to be of good quality in general, with follow-up provided where necessary and within costs (taking into account inflation and currency fluctuations). Final beneficiaries have full access to project results, use them and in the longer term will increasingly benefit from them. The PRP could benefit from a close cooperation with the other EDF projects ongoing in T&T, especially the Rural Electrification Programme (REP), which also deals with poverty reduction through electrification of poor rural areas. Links have already begun.

The programme received good results from the monitoring mission in 2004.

PROJECT PROFILE

Unit: AIDCO/C/4

AIDCO Contact: Gaetano Viti
EDF Unit Coordinator: Marlene Antoine
Delegation Officer: Peter Ashton

1. Title of project: SUPPORT TO THE OFFICE OF THE NAO (EDF Unit)

2. Project number: 8 ACP TR 12

3. Basic administrative data

Type of project	INSTITUTIONAL STRENGTHENING
Country	Trinidad and Tobago
Signature of the FA (DAG)	28 May 2002
Start date	01 June 2002
Implementation deadline	31 May 2005
Operational duration	36 months
Convention budget:	
➤ TOTAL	576,200.00
➤ EU	576,200.00
➤ Private sector/National counterpart	
Current financial Situation (22/02/2005)	
-Primary Commitment	576,200.00
- Contracts	540,500
- RAC (Balance on commitment)	35,700
- Payments	212,165
	237,507

4. Project description

- This project has 1 main purpose:

To strengthen the capacity of the Office of the NAO in the Ministry of Planning and Development in order to efficiently fulfil its aid management and administration role.

- The expected results are:

A properly functioning EDF unit capable of managing/administering efficiently, aid cooperation programmes in general and TT-EU cooperation in particular.

These results will be achieved through the following activities:

- **Result 1:** Recruitment of programme coordinator, assistant programme coordinator, programme officer and office manager/secretary
- **Result 2:** Training conducted as necessary for EDF unit staff and staff of the Ministry of planning and others on project management issues

5. Problems and envisaged solutions

Problem:

The EDF Unit was without a Coordinator between June 2004 and February 2005 following the resignation of the previous Coordinator.

Solution:

Excellent candidate has been recruited and commenced duties on 1 February 2005. EDF Training will be required, as contractual arrangements were not finalised in time for the candidate to participate in the 9th EDF Training Workshop in Guyana in 09/04.

Problem:

The EDF Unit needs to be more fully integrated into the work of EDF management. It relies too heavily on the Delegation at present.

Solution:

Institutionalisation and development of its EDF management role to be prioritised and extended. This challenge was clearly explained to new incumbent at interview.

PROJECT PROFILE

Unit: AIDCO/C/3

Task Manager: Agnes Guillaud
Project Manager: Richard Joseph
Delegation Counsellor: Anthony Smallwood

1. Title of project: CARIBBEAN BUSINESS SERVICES LTD (CBSL)

2. Project number: 8 ACP TR 14

3. Basic administrative data

Type of project	BUSINESS DEVELOPMENT
Country	Trinidad and Tobago
Signature of the FA	11 June 2003
Start date	1-July 2003
Implementation deadline	31-March-2006
Operational duration	33 months
Convention budget:	
➤ TOTAL	2,682,500.000
➤ EU	1,982,000.000
➤ Private sector/National counterpart	up to 700,500.00

4. Project description

- This project has 1 main purpose:
 1. To increase the competitiveness and export readiness of small and medium sized manufacturing and service companies in the non energy sector and thus diversify the economy away from the oil and gas sector upon which the T& T economy is overdependent.

- The expected results are:
 1. An increase in knowledge and awareness of selected enterprises of the issues they need to consider and/or address to improve their international competitiveness in the face of trade liberalisation.
 2. These enterprises will have benefited from subsidized business development technical assistance interventions available through the project and therefore be in a better position to maintain/increase market share for their products, improve their incremental earnings, generate employment and reduce costs.

The envisaged activities to deliver the above-mentioned results comprise:

- An Awareness Building Service (ABS) consisting of training events, seminars and symposia on industry specific topics to inform enterprises of the issues they need to address in improving competitiveness. The service is a one-stop shop where companies receive information about both EU and non-EU funded technical assistance.
- A competitiveness service (CBS) which provides consultants to

selected enterprises on a cost-sharing basis to assist in increasing the competitiveness of their businesses.

5. Problems and envisaged solutions

The project is a follow on from the previous phase (2000-2003) which provided services and support to a number of client enterprises but was not considered to have reached its full potential – hence Phase II which began in July 2003. Greater awareness of the services offered was recognised as an urgent requirement for this second phase, and the inclusion of the ABS has remedied this weakness of the phase I project.

At present, the project has completed its start up work programme, the first full work programme is almost complete and the second work programme has been approved in principle although payments have not begun because of problems in meeting the new 9th EDF requirements for a bank guarantee. In general, the CBSL programme has run smoothly with few problems.

The programme received a good result from the monitoring mission in October 2004.

PROJECT PROFILE

Unit: AIDCO/C/7

Task Manager: Jaime Diez Canseco
Project Coordinator: Richard Sitahal
Programme Officer: (previously Victor Arroyo, new programme officer in recruitment)

1. Title of project: RURAL ELECTRIFICATION

2. Project number: 9 ACP TR 1

3. Basic administrative data

Type of project	ELECTRICAL TRANSMISSION/ DISTRIBUTION
Country	Trinidad and Tobago
Signature of the FA	June 2004
Start date	July 2005 (estimate)
Implementation deadline	31 Dec 2008
Operational duration	24 months
Convention budget:	
➤ TOTAL	1,850,000
➤ EU	1,850,000
➤ Private sector/National counterpart	

4. Project description

Government supported rural electrification programmes came to a halt in the mid-1980s, when fiscal revenues fell sharply as a result of depressed oil prices and reduced oil production. The programme was resumed in the early nineties with funding provided under the 6th EDF (Rural Electrification Phase I). Over the period 1995-2000, 67 projects were identified and implemented using these funds.

The public electricity supply reaches an estimated 94% (311,045) of the 330,000 households in Trinidad and 99% in Tobago. The remaining 6% of the households in Trinidad is made up principally of households in communities to which extension of the distribution system is not a viable economic proposition due to low population densities and/or isolation from the main distribution system. Absence of electricity impedes living conditions and prompts the younger generations to move elsewhere.

- This project has 1 main purpose:

To improve the living conditions of households in the target communities that are currently without an electricity supply.

- The expected results are:

The availability of public electricity supply to approximately 1,052 households in 82 rural communities.

These results will be achieved through the following activities:

- Purchase of materials for erection of overhead electricity lines and works contracts with local electricity contractors for the installation.
- Tenders for works according to the standard Government procedures and for supplies by restricted invitation to tender.
- Logistical and engineering support will be provided by T&TEC. The beneficiaries of the project will contribute through voluntary labour (bush clearing, pole erection and pulling of cables and conductors).

The estimated capital cost of the project is EUR 1,840,000 as follows:

Materials	EUR 1,350,000
Contracted Labour	EUR 250,000
Contracted Supervision	EUR 50,000
Technical Audit	EUR 30,000
<i>Contingencies (@5%)</i>	EUR 100,000
Total paid labour and materials	EUR 1,780,000
Voluntary Community Contribution	EUR 70,000
Total Estimated Cost	EUR 1,840,000

5 Monitoring

- Technical assistance to T&TEC began in February 2005 and will last for three months, it will facilitate the preparation of the implementation agreement and tender documents
- Clarification of the inclusion or not of the identified new communities.

6. Problems and envisaged solutions

Lessons learnt from previous projects/evaluations

Delays were experienced in some Phase I projects due to difficulties of working on some coastal swampy areas and in shipment of materials to Tobago. No further projects are planned for coastal areas or for Tobago under this Phase II project.

Technical evaluation of the Phase 1 programme was very positive and highlighted the following issues which are part of the approach to the proposed Phase II (2002):

- Beneficiaries generally make the effort to get connected to the supply as soon as possible after extension.
- Inventory management arrangements, involving the separate storage of materials procured for the project and a control system based on the assignment of job account numbers, proved administratively feasible.
- Community contribution of voluntary labour worked well, the main requirement being proper supervision by the contractor and T&TEC.

Delays in schedule

The financing agreement of the project was signed in June 2004 but since this date a number of circumstances have caused start up to be delayed:

- Hurricane reconstruction in Grenada and Tobago. T&TEC resources have been considerably stretched by emergency work in the region.
- A number of communities identified during project preparation were already electrified before the signature of the financing agreement. A provisional list of new communities meeting the criteria in the FA has been submitted by T&TEC for consideration. This has caused further delays to programme implementation. The PMU has its full contingent of staff and is presently working on finalising the list of projects.

The consultancy firm AETS began work in February 2005. The assignment is to assist the project Steering Committee in the application of EDF procedures to be followed by the PMU (T&TEC) and to help update and revise all project tender documents. The project will commence with the electrification of already identified communities and the identification of new communities for electrification should proceed rapidly, a list has already been submitted to the NAO.

Despite the delays the programme received good results from the monitoring mission in 2004.

PROJECT PROFILE

Unit: AIDCO/C/2

**AIDCO Contact: Charlotte Minasyan
 Project Manager: EDF Unit
 Programme Officer: Peter Ashton**

1. Title of project: TECHNICAL COOPERATION FACILITY (TCF)

2. Project number: 9 ACP TR 002

3. Basic administrative data

Type of project	TECHNICAL SUPPORT
Country	Trinidad and Tobago
Signature of the FA	November 2004
Start date	February 2005
Implementation deadline	31 st October 2008
Operational duration	4 years
Convention budget:	
➤ TOTAL	1,000,000
➤ EU	1,000,000
➤ Private sector/National counterpart	

4. Project description

- The overall objectives of the programme are:
 - The implementation of the Government’s Development Strategy through the support of sound development programmes financed from the European Development Fund (EDF).
 - The fostering of a more coherent and informed approach to issues of development, trade, etc.

- The expected results are:
 - Identification of programmes to be financed from the EDF
 - Preparation and formulation of programmes to be supported from the EDF
 - Enabling the NAO’s Office and the ministries and agencies concerned to maintain satisfactory implementation and monitoring of ongoing projects when this cannot be provided for in the projects
 - Financing audits and/or evaluations whenever they cannot be financed out of the project itself or where it is convenient or efficient to combine a number of audits/evaluations of related interventions
 - To increase understanding of issues of development, trade, etc by key actors
 - Improving the statistical basis and capacity for monitoring and assessing progress in achieving the objectives of the 9th EDF programmes and the Millennium

Development Goals (MDGs) in education and health, and the wider Cotonou objective of poverty reduction

5. Problems and envisaged solutions

The absence of the NAO on extended pre-retirement leave has slightly delayed formulating a plan for the best use of the TCF funds. This will hopefully be rectified very soon with the GORTT 'buying back' some of the NAO's leave and thus enabling her to continue as the NAO for the remainder of 2005.

PROJECT PROFILE

Unit: AIDCO/C/5

AIDCO Contact: Juan Casanova Arasa
Project Coordinator: (EDF Unit)
Programme Officer: Terhi Karvinen

1. Title of project: SUPPORT TO THE NATIONAL HIV/AIDS STRATEGIC PLAN

2. Project number: 9 ACP TR 003

3. Basic administrative data

Type of project	HEALTH
Country	Trinidad and Tobago
Signature of the FA	Signed by Commission December 2004
Start date	June 2005 (estimate)
Implementation deadline	31 st December 2009
Operational duration	4 Years
Convention budget:	
➤ TOTAL	7, 130,000
➤ EU	7, 130,000
➤ Private sector/National counterpart	

4. Project description

The project will support the GORTT's National HIV/AIDS Strategic Plan. Implementation of project activities will be managed by the National AIDS Coordinating Committee (NACC) Secretariat and be framed in a comprehensive General Work Plan (GWP) and more detailed Annual Work Plan (AWP).

The project's main purpose is to:

- Contribute to the reduction and prevention of the spread of HIV/AIDS in Trinidad and Tobago
- Mitigate the negative impact of HIV/AIDS on persons infected and affected in TT

EU support to the NSP will be in five priority areas:

A- Prevention of the spread of HIV/AIDS: the aim is to involve communities in identifying ways to prevent sexual transmission of HIV and to reject major misconceptions about it.

B- Treatment, care and support: strengthening the existing delivery system through decentralised and integrated service provision for HIV/AIDS.

C- Advocacy and Human Rights: to guarantee human rights by tackling all forms of stigma and discrimination, particularly that suffered by the most vulnerable groups

D- Programme management, Coordination and Evaluation: to support NACC activities by facilitating NACC legislative initiatives on HIV/AIDS discrimination in the work place and by measures to institutionally strengthen the NACC Secretariat and the HIV/AIDS Substance Abuse Commission in the THA (Tobago House of Assembly).

E-Implementation of the Tobago response: the aim is to strengthen the multipurpose Health promotion clinic enabling it to deliver a set of comprehensive services to PLWHA and to the general and at risk population.

Project implementation

The proposed Project will support NSP implementation at **three levels of intervention:**

- **Level 1 (National):** policy; coordination; integration; legislation (review, modification and adaptation); PLWHA inclusion (with training and capacity building for job creation and social and economic support); business sector and labour inclusion (training and occupational health); fostering international best practices and the ILO code of conduct.
- **Level 2 (Decentralized):** VCT, drop-in and treatment centres, wider and managed access to service, outreach and integration with civil society, management of intersectoral activities addressing the needs of PLWHA and their families, integrated services linked to poverty reduction and education. Medical and nursing staff capacity building with a focus on the development of health management capacity at the main and the peripheral and grass-root sites.
- **Level 3 (Tobago):** a central multi-purpose health promotion clinic will be supported to promote:
 - Clinical diagnosis and treatment
 - Promotion of safe sexual behaviour in the general population and in the vulnerable high risk groups
 - Prevention of mother-to-child transmission
 - Increase knowledge of, and partnerships with, communities and families
 - Rehabilitation: (medical, social and economic) of PLWHA
 - Post exposure treatment and control of STDs
 - Postponement of first sexual activity in young people
 - Mobilization of media, NGOs, CBOs and FBOs

5 Problems and envisaged solutions

There was a delay whilst the Financing Proposal was in Brussels for almost a year. However the Financial Agreement was finally sent in December 2004 and is now awaiting signature by the GORTT.

No fundamental problems are envisaged. The National AIDS Coordination Committee (NACC) and the NACC Secretariat (which will manage the project) is established and activities are already underway on the basis of World Bank and government funding.

PROJECT PROFILE

Unit: AIDCO/C/5

**AIDCO Contact: Madeleine Kihlberg
EDF Unit Project Manager:
Programme Officer: Peter Ashton**

- 1. Title of project: SUPPORT TO POST – SECONDARY EDUCATION IN TRINIDAD AND TOBAGO**
- 2. Project number:**
- 3. Basic administrative data**

Type of project	EDUCATION SECTOR POLICY SUPPORT PROGRAMME
Country	Trinidad and Tobago
Signature of the FA	TBA
Start date	
Implementation deadline	
Operational duration	
Convention budget: ➤ EU	27,300,000

4. Project description

The proposed programme has been developed within the overall framework of the Trinidad and Tobago – European Community *Country Strategy Paper 2002-2007*. At the time of that Strategy Paper (2001) two specific projects were suggested for funding in the education sector

- (i) a major project to increase the capacity and quality of the tertiary system by supporting the development of COSTAATT (College of Science Technology and Applied Arts of Trinidad and Tobago) - at that time the institutional basis of public sector tertiary reform,
- (ii) a minor project to establish a permanent science and technology centre (strongly promoted by NIHERST (National Institute of Higher Education Research, Science and Technology) whose colleges were to be absorbed by COSTAATT but whose science and technology promotion role was to be enhanced).

While the overall objectives of tertiary education reform remain in place, the evolution of tertiary policy since 2001 (when the NIP was drafted) now demands a more integrated and coherent EDF response than the simple project approach originally envisaged.

- Firstly, although the role of science and technology in economic development is given undiminished weight by the Government, there is now a consensus that it is better treated as an integral part of the school curriculum rather than as a distinctly separate activity covered by a minor project.

- Secondly, the key institutional role originally identified for COSTAATT has been considerably modified by the decision to create a new University of Trinidad and Tobago (UTT), partly on the basis of incorporating certain institutions and types of training that were previously to move to COSTAATT. Given the very high demand from both students and employers there is a strong logic to justify the creation of the UTT. COSTAATT remains a key institutional player in the reform of the tertiary sector but its development now needs to be seen in the wider context of broad tertiary sector reform which now has a policy framework which was not apparent previously.

Accordingly, and consistent with current EC development cooperation policy, the draft financing proposal now emphasises support for the sector rather than the funding of specific projects. There is a far greater probability that EC assistance will make a sustainable impact if it is concentrated on the overall reforms and development of the sector rather than being dissipated among a series of individual project actions. The proposed SPSP (Sector Policy Support Programme) has been prepared in accordance with actions and decisions agreed during extensive meetings between the EC and GORTT and has incorporated ideas from technical assistance reports and a series of workshops held during 2004.

- **Purpose**

The overall objective of the programme is to support the Government's strategic (2020) vision of a small country integrated into the global economy by way of a diversified, sustainable knowledge-based economy with a trained and adaptable workforce.

The specific objectives are to assist the reform and restructuring of the post secondary non-university tertiary sector. Through a combination of reform and capacity expansion, notably in the consolidated institutions of COSTAATT and the sub degree programme of the UTT, the proposed programme will provide a cost-effective contribution to both economic and social development. The principal economic contribution will come through the enhanced supply of required technical and vocational skills at certificate and diploma (i.e. sub degree) level. The social contribution will come from the enhanced provision of educational opportunities for the substantial proportion of the age group which has been seriously under-served by the limited and fragmented capacity of the current system at the non-university level. This focus on access and relevance will support the empowering of individuals and families and contribute to poverty reduction through the formation of productive skills

- In order to achieve the specific objectives, the principal results anticipated from this programme of support are:
 1. The participation rate in tertiary education is expected to double within five years;
 2. The emphasis in tertiary expansion will be upon increasing the number of students in the non-university tertiary sector. At present, such students constitute around 40 percent of total tertiary enrolments on a full-time equivalent basis. It is expected that the non-university to university student ratio will approach 50:50 within five years;
 3. A rigorous programme of amalgamating institutions and rationalising course offerings will contribute to improved cost-effectiveness. At present, the high cost

per student in most non-university institutions means that Trinidad and Tobago is getting poor value for money from *total* public expenditure even though it is adequate by international standards. Progress in reducing unit costs to nearer appropriate international standards will mean that Trinidad and Tobago can increase both quality and the number of enrolments for a given amount of public expenditure;

4. A new system of public funding for the non-university institutions will be introduced. This system will entail development of an efficient, equitable and transparent enrolment and cost-based formula which can be applied across the board to the relevant institutions. This will replace the existing system of widely differing funding arrangements which are a legacy of fragmented policy and constantly shifting ministry responsibilities;
5. Legislation to bring the National Accreditation Council into being was signed in June 2004 and key appointments have now been made. Accreditation of institutions, especially in the context of multiple public and private colleges, is a major mechanism of quality control. It is expected that the next five years will bring into operation a proper, transparent and rigorous process of inspection and accreditation. In this way a major result anticipated from this program of support will be the fostering of improved quality of student outcomes.

5. Monitoring

The programme will conform to well established SPSP procedures.

6. Problems and envisaged solutions

During 2004 the feasibility study on the potential for reform of tertiary level education and training in TT was completed, but far later than planned due to severe tendering delays. The drafting of a Financing Proposal was further delayed due to changes in FP format, staff changes in both the NAO/EDF Unit and the EC delegation, and the need to build support for the sector approach which is a new departure in EC/T&T cooperation.

The draft FP has now been with the GORTT since early December 2004 and it has been difficult to move the dossier forward with the NAO on extended pre – retirement leave. This will hopefully be rectified very soon with the GORTT ‘buying back’ some of the NAO’s leave and thus enabling her to continue as the NAO for the remainder of 2005.

There is concern regarding the availability of solid data essential for a successful SPSP. This may necessitate the recruitment of further expertise through a framework contract.

PROJECT PROFILE

Unit: AIDCO/C/ 5

AIDCO Contact: Juan Jose Casanova-Arasa
Project Manager: Valerie Wilson
Programme Officer: Terhi Karvinen

1. Title of project: STRENGTHENING OF MEDICAL LABORATORY SERVICES IN THE CARIBBEAN

2. Project number: 8 ACP RCA 20

3. Basic administrative data

Type of project	MEDICAL SERVICES
Country	Regional Caribbean
Signature of the FA	August 2001
Start date	1-October-2001
Implementation deadline	30-Sept-2005
Operational duration	48 months
Convention budget:	
➤ TOTAL	9.777,000,000
➤ EU	7.500,000,000
➤ National counterpart	2.277,000,000

4. Project description

- This project has 1 main purpose:

Improved management of and coordination between public and private laboratories in the CARIFRUM region leading to increased availability of high quality laboratory information.

- The expected results are:

1. **Legislation and accreditation:** regional medical laboratory standards and accreditation mechanism and national legislation and registration scheme established
2. **Human resource development:** Training capacity at the national and regional levels in the field of medical laboratory Quality Assurance (QA) enhanced; public and private sector laboratory staff trained in medical laboratory QA in the 15 CARIFORUM countries.
3. **Laboratory Management:** Public and private laboratory management improved through implementation of the QA programme.
4. **Regional Cooperation:** Greater regional coordination and integration through the establishment of laboratory networks to facilitate sharing of expertise, services and information.
5. **Operational research:** Operational research findings utilised and influencing laboratory management and public health policy, decision making and action.

- The envisaged activities to deliver the above mentioned results can be summarized as follows:

1. Assistance to the Regional Office for Standards and Quality (CROSQ) in collaboration with National Bureaux of Standards to establish a regional

accreditation and monitoring body for medical laboratory QA. On-going work in regulatory legislation in the region will generate a regional model for national registration and control of laboratory practices

2. Training of regional assessors and national QA coordinators, laboratory directors and trainers of trainers through both regional workshops and residential internships in overseas labs. These trained staff will then train all lab technologists within their respective countries. Upgraded capacities in training institutions will strengthen the training of new recruits. The regional continuing education and distance learning programmes will facilitate life long learning among lab technologists.

3. Appointment of national QA coordinators and committees in each country. Their tasks include the development and implementation of national strategies and annual plans, and the development of databases and monitoring systems. Emphasis will be on training laboratory heads (public and private) in good laboratory management practices.

4. Development of databases on all aspects of lab and epidemiological services, sharing of information on new developments, regional proficiency testing and establishing a network of regional reference nodes.

5. Operational research into key issues including the mix of public and private labs, financing strategies, maintenance and procurement personnel management and lab information systems.

5. Problems and envisaged solutions

Following agreement to establish a separate PMU (project management unit), the issue of whether the UN-EC Framework Agreement, or the EDF Procedures should apply to this project was finally resolved. All finances will pass through the PMU which will be subject to EDF rules. A Programme Implementation Unit (PIU) will be responsible for all operational activities using funds disbursed through the PMU. The staff of the project will operate under two separate regimes. Those in the PMU will have standard EDF service contracts, those in the PIU will have CAREC contracts. Funds will be provided through the WP to pay for the CAREC contracts.

The problems vary between countries in the CARIFORUM region. All countries accept that their laboratory networks are in need of improvement but some of the countries are more advanced than others in reforming them. In addition, the problems faced by public laboratories are different from those faced by private laboratories.

The project is an important one, but is unlikely to fully achieve its original and probably overambitious aims given the significantly shorter time now available for implementation than originally envisaged. The financial state of the Year 2 Work Programme (2004) was well below estimates leading to even more activities being moved forward to the final year. However, a request for an extension of one year has just been received (February 2005) following a favourable Mid Term Review which strongly supports such a move.

The resignation of the Project Accountant in December 2004 may delay the orderly closure of previous work programmes. Recruitment for a new accountant is in progress.

PROJECT PROFILE

Unit: AIDCO/C/7

AIDCO Contact: Howard Barton
Project Manager: Tyrone Sutherland (CMO)
Programme Officer: Ismo Ulvilla (Guyana) - pending recruiting a replacement programme officer.

1. Title of project: REGIONAL WEATHER RADAR WARNING SYSTEM PROJECT

2. Project number: 9 ACP RCA 1

3. Basic administrative data

Type of project	GENERAL SERVICES	GOVERNMENT
Country	Regional Caribbean	
Signature of the FA	30 November 2003	
Start date	March 2005	
Implementation deadline	30-June-2011	
Operational duration	39 months	
Convention budget:		
➤ TOTAL	13,200,000.00	
➤ EU	13,200,000.00	
➤ National counterpart		

4. Project description

This project is a regional Caribbean project managed from Trinidad and Tobago. The Caribbean Meteorological Organization (CMO) acts as the Implementing Agency on behalf of CARIFORUM (the Regional Authorizing Authority).

- This project has 1 main purpose:

The purpose of this Project is to make more accurate, real-time weather data available to the relevant services in the region in an easy accessible way. The data provided by the new radar system will greatly improve the ability of the National Meteorological Services to predict the path and the intensity of hurricanes and other severe weather, and thus to provide more accurate and timely warnings to the population of the region. The Project radars will form the primary severe weather early-warning tool in the region, and the radar data will be made available to the public, governments, and disaster preparedness organisations.

By constructing and equipping four new digital weather radar early warning stations, the project will complete a network of nine such stations in the region. The network replaces an earlier regional system which has been decommissioned having far surpassed the end of its normal working lifetime.

A regional modern weather radar network is urgently required in the Caribbean to provide early warning and monitoring of hurricanes, tropical storms and other severe tropical weather that cause risk to life and property, and threaten sustainable development in the region. Hurricane Ivan (2004) has highlighted the risks of not having such a system in place.

The four stations will be located in Barbados, Belize, Guyana and Trinidad & Tobago. The five other existing radars which will make up the network are in the Dominican Republic (which also covers Haiti), Jamaica (which partly covers the Cayman Islands), Guadeloupe (which also covers Antigua and Barbuda, Dominica and several Leeward Islands), Martinique (which also covers Dominica, Saint Lucia and most of the other Windward Islands), and French Guiana.

The French Meteorological Service, Météo France, will host facilities in Martinique to generate an operational composite picture from all the radars in the network.

The duration of the implementation phase of the Project is three years and three months, from the formal Project launch date until final acceptance of the radar systems. After implementation, the radars have a planned life of fifteen years.

- The expected results are:

1: Meteorological Radar Systems. The key activities are:

- 1.1 Establishment of a Project Management Unit.
 - (a) Launching and evaluation of tenders and procurement of equipment.
 - (b) Supervision of radar site construction and installation.
 - (c) System testing and final acceptance for operational use.
- 1.2 Transfer to Governments and entry into operational service.

2: Communications Network. The key activities are:

- 2.1 Configuration of transmission systems.
- 2.2 Specification, procurement, installation, testing, and final acceptance of equipment.
- 2.3 Provision of telecommunications systems for non-meteorological user services.
- 2.4 Transfer of activities to responsible Governments.

3: Strategic Human Resource Development Interventions. The key activities are:

- 3.1 Determination of requirements in relation to personnel available.
- 3.2 Arranging training courses at suitable levels in radar meteorology.
- 3.3 Arranging training in radar hardware maintenance, data processing and telecommunications for the equipment and services to be used.

4: Improved access to weather data. The key activities are:

- 4.1 Determination of the type and quantity of radar data to be made available to users.
- 4.2 Provision of radar images to users via the Internet or other pre-existing systems.

- 4.3 Liaise, as a part of existing regional procedures, with disaster preparedness organisations, the media, and special users, on the interpretation and use of the new radar images.

The total cost of the project is estimated at EUR 13.20 million. The cost breakdown in EUR is as follows:

Project Management Unit, Technical Assistance, Start-up/Design phase	1,383,313
Civil Works Buildings	3,084,932
- Design & Supervision-	330,529
- Works-	2,754,403
Radar Systems Supply & Installation	7,159,467
Display Systems and Information Technology	236,216
Composite System/Service, Météo France	440,344
Project mid-term review /evaluations / auditing	468,229
Grand TOTAL	13,200,000

5. Monitoring

- Tender launched for Project Management Unit service contract (the company who would be in charge of the management of the project). The tenders have been evaluated and the contract awarded to a consortium comprising the UK Meteorological Office and a Dutch consultancy firm Royal Haskoning. The contract was signed by the DRAO in February 2005 and is currently with the contractor for their signature.
- Two more tenders to be launched in early 2005 – Radar Supply and Civil Works Design. Tender documents are almost finished and forecast notices have been published in the commission web site.

6. Problems and envisaged solutions

In developing the Project plan, lessons of past experience have been taken into account. These include:

- Experience with analogue and digital weather radar installation and operation, from the NMSs in the region;
- Experience in specifying, purchasing, installing and commissioning complex radar networks (for use in weather monitoring, air traffic control, etc.);

- Experience in the creation and operation of radar composite images for use by weather forecasting staff.

The project has been over two years in development largely due to administrative requirements in the documentation. The FA was finally signed by Brussels in mid November and by CARIFORUM on 18th December 2003.

A short term contract (EUR100,000 HQ DAG: 9 ACP RCA 6 and contract for Euro 60,000 plus 15,000 contingencies) was concluded with SEMA/ EUROSTRATEGIES (who prepared the original Financing proposal) to complete the following tasks:

- i) Preparation of Tender dossier for the service contract of the Project Management Unit
- ii) evaluation of bids for this service contract
- iii) finalisation of the tender dossier for radar supply
- iv) evaluation of bids for this supply contract.

This contract began in January 2004.

The programme has been much delayed, mainly due to tendering delays but the PMU contract has now been awarded and the PMU team will start operations in March 2005.

The other major contracts for works and supplies are well advanced. As soon as the PMU is in place it is foreseen that the programme will move forward with greater speed.

Annex XIII: Migration profile for Trinidad and Tobago

Trinidad and Tobago, with a population of 1.3 million, is one of the larger Caribbean island states and is also relatively unusual in having a very heterogeneous population. The main groups are Afro-Caribbean and 'East Indian' (originally from South Asia) but there are also significant numbers of Latin Americans (mainly Venezuelan), Chinese, and Europeans. Emigration and immigration have been key processes in the development of Trinidad and Tobago.

Emigration is a popular option for many skilled Trinidadians and the post-war period has seen large numbers emigrate to USA, the UK and Canada. All three of these countries now have large émigré populations and Trinidadian emigrants have been welcomed and easily integrated because of the relatively high skills they bring with them. Statistics from official sources and the average annual emigration ratio of around 2000 noted in the early 1990's is probably an underestimate. However the lack of statistics, especially in the last five years, does not disguise the impact of what has been a serious brain drain over many years. It is nowhere more dramatic than in the health service where Trinidad, a significant regional trainer of medical staff, is currently having to 'import' Cuban and other doctors and nurses.

Not all Trinidadian emigrants are skilled or legal and every year the USA deports back to Trinidad many Trinidadians who are either illegally residing in the US or who have fallen foul of the law. These 'deportees' are an increasingly serious problem in Trinidad and have been identified as one of the factors driving the serious increase in violent crime.

Trinidad also attracts migrants and over 1,000 a year have been legally registered since 1997. A similar number of travellers to Trinidad are refused permission to land which suggests that illegal immigration is an issue. This is confirmed anecdotally by newspaper reports. Most immigrants to Trinidad are from Guyana and nearby Anglophone islands but many also come from Venezuela.

Migration patterns to and from Trinidad and Tobago have deep historical roots but the motivation today is essentially economic. Trinidad and Tobago has been a major exporter of skilled manpower since the war but increasing wealth and better employment opportunities deriving from energy exports could radically change migration patterns in the future.

Draft Migration profile for Trinidad and Tobago

MIGRATION PROFILE TRINIDAD & TOBAGO

Box 1 :

Immigrants

Total number of residents	1.3 million
Of which :	
Own nationals	NA million
Immigrants	NA million (%)

Status immigrants

Refugees	NA %
Labour migrants /permanent	NA %
Labour migrants/seasonal	NA %

p.m. internally displaced persons

Immigration trend

Number of arriving immigrants in 90/95:	3200
Number of arriving immigrants in 95/99:	4500

The number of permanent immigrants in TT each year is around 5 people (in 1997, 98, 99), but the number of temporary immigrants is more or less 1000 people each year.

The Caribbean country with **the largest concentration of immigrants** is Trinidad & Tobago, with 35.4 % of the total stock of Caribbean migrants in the region.

Education: Skilled labour NA %

Main countries of origin Grenada, Guyana, Venezuela

Rate of return NA %

Finance

Amount of outgoing migrant remittances:	NA \$ million
Remittances as % of GDP:	NA %

Box 2: Emigrants

Total number of emigrants NA million

Status emigrants

Refugees	NA %
Labour migrants /permanent	NA %
Labour migrants/seasonal	NA %

Legal situation emigrants

Documented	NA %
Undocumented	NA %

Trend

Number of leaving migrants in 90/95:	about 8000
Number of leaving migrants in 95/99:	less than 150

Net migration rate² (2003): -10,79 migrants/1000 population

Education: Skilled labour NA %

Main countries of destination: USA, Canada, Grenada, SVG

Many people from TT live in Grenada and SVG.

Most Caribbean countries have been represented in the overall migration streams to the United States in the 1990s, in particular Trinidad & Tobago and Barbados. Even those countries with only small numbers of migrants, the numbers are sometimes quite significant as a percentage in relation to the small populations of the Caribbean states.

Rate of return NA %

Finance

Amount of incoming migrant remittances NA \$ million

Remittances as % of GDP: NA %

² This entry includes the figure for the difference between the number of persons entering and leaving a country during the year per 1,000 persons (based on midyear population). An excess of persons entering the country is referred to as net immigration (e.g., 3.56 migrants/1,000 population); an excess of persons leaving the country as net emigration (e.g., -9.26 migrants/1,000 population). The net migration rate indicates the contribution of migration to the overall level of population change.

Annex XIV: Country Environment Profile

Please see below copy of 'State of the Environment Report 2000' by the Environmental Management Authority (EMA)

NB More recent profiles are awaiting cabinet approval.

TRINIDAD AND TOBAGO
STATE OF THE ENVIRONMENT REPORT
2000

ENVIRONMENTAL MANAGEMENT AUTHORITY
2ND Floor, The Mutual Centre
16 Queen's Park West
Port of Spain
Trinidad & Tobago
Telephone: (868) 628-8042/44/45
Facsimile: (868) 628-9122
E-mail: ema@ema.co.tt

© EMA, January 2001

CHAIRMAN'S MESSAGE

The year 2000 was a challenging year for the Environmental Management Authority (EMA). A new Board of Directors assumed office in August and the Organization focussed on the drafting of subsidiary legislation (Rules) in accordance with Sections 26 and 27 of the Environmental Management Act No. 3, 2000. The process required that the draft rules be submitted for public comment, be revised in keeping with the public comments, published in the Gazette and laid thereafter in Parliament subject to negative resolution. These rules when enacted as law will provide the Authority with the legislative framework that is essential for its enforcement and regulatory responsibilities.

While the 1997, 1998 and 1999 Reports analysed the status of our Biodiversity, Freshwater and the current situation with regard to environmental legislation and its enforcement, this Report provides an analysis and status of air pollution in Trinidad and Tobago because of the critical importance of air quality in the sustainable management of the environment and human health.

Trinidad and Tobago is the most industrialized country in the Commonwealth Caribbean region and suffers the attendant environmental problems associated with the production of oil, natural gas and petrochemicals in addition to rum, soap, paint and wood products. It is not surprising therefore to find a situation in which industrial pollution particularly from oil, gas and the downstream petrochemical industry is a critical environmental issue. Furthermore the fact that Trinidad & Tobago has the highest motorization (vehicles per capita) level in Latin America and the Caribbean results in the transportation sector having a significant impact on air quality. Trinidad and Tobago therefore needs to address the environmental implications of the energy and transport sectors.

Air that is free of fine particulates, gaseous pollutants and odours is essential for the protection of human health. Air pollution also adversely affects the natural and built environments through unsightly deposits on vegetation and the soiling of buildings. In Trinidad & Tobago air pollution is caused mostly by emissions from vehicles, power plants and energy based industries. Forest and bush fires, uncontrolled burning to prepare land for crops, the burning of sugarcane fields during the harvest and the use of bagasse as a fuel all create windblown smoke, soot, dust and chaff that pollute our atmosphere with particulate matter. In addition, during the dry season fires at our landfills pose a serious threat to the environment.

In seeking to regulate air pollution, the EMA has drafted Air Pollution Rules and Air Pollution Fees Regulations which are to be laid in Parliament subject to negative resolution. National ambient air quality standards and criteria are being established under the prescribed rules for Trinidad and Tobago.

These will serve as the air quality objectives for the setting of limits for pollutants that may be released into the ambient air by various sources. The national ambient air quality standards will provide a basis for protecting public health from the adverse effects of air pollution and for eliminating, or reducing to a minimum, those air pollutants that are known to be or are likely to be hazardous to human health and the environment.

In collaboration with the Bureau of Standards appropriate Vehicle Emissions Standards are being prepared by the Bureau and Regulations are being drafted by the EMA under the Motor Vehicles and Road Traffic Act. Both the draft Standards and the Regulations would be completed in 2001. The phasing out of lead in gasoline by the year 2002 in accordance with the United Nations Development Programme/World Bank Energy Sector Management Assistance Programme for the elimination of lead in gasoline in Latin America and the Caribbean, will also be given high priority.

Given the emerging picture of the serious risks posed by global environmental changes on small island developing states, perhaps one of the most serious environmental challenges facing Trinidad and Tobago, as a result of global warming and climate change is sea level rise; with associated coastal erosion and salt water intrusion into our estuaries and aquifers.

While we are a very minor contributor to green house gas emissions on a global scale, we are one of the major contributors among developing countries on a per capita basis. The most recent scientific estimates indicate that by the year 2100, the world will on average experience a temperature rise of 1 ° C to 3.5 °C, a sea level rise of 15 to 95 cm plus a rainfall deficit of about 15%. Our climate may therefore become hotter and drier, posing significant threats to our valuable marine and terrestrial ecosystems. The EMA will address these global environmental issues by implementing vulnerability assessment studies of our marine and terrestrial ecosystems that will be utilized to develop adaptation programmes.

The analyses and data presented in the Report on air pollution have demonstrated information gaps in basic ambient air quality that need to be closed for the implementation of effective air pollution control programmes. The EMA, however, recognizes the need to establish a firmer scientific basis from which to tackle the problems that are exacerbated by our country's rapidly growing industrial and transportation sectors. The challenge is therefore to identify, in spite of scientific uncertainties, prudent, cost effective and adaptive management approaches that can be implemented with the full support of the private sector, NGOs, CBOs and civil society.

Finally, it is my honour to acknowledge the work of the past Board, management, and staff who piloted the EMA through this crucial period of its early development and who have provided a solid foundation for the exciting and challenging road ahead.

STATE OF THE ENVIRONMENT REPORT

2000

STATE OF THE ENVIRONMENT REPORT

TABLE OF CONTENTS

Abbreviations	6
Glossary	8
Executive Summary	18
1.0 Introduction	20
2.0 Major Air Pollutants and their Adverse Effect on Human Health and the Environment	22
3.0 General Assessment of the Air Pollution Problem in Trinidad and Tobago	37
4.0 Status of Institutional Administration and Legislative Controls and Policy Specific to Air Pollution	47
5.0 Strategies for Air Pollution Control	53
References	69

ABBREVIATIONS

C ₂ H ₃ Cl ₃	1,1,1-Trichloroethane
CBO	Community based organisation
CFC	Chlorofluorocarbons
CH ₄	Methane
Cl ₂	Chlorine
CNG	Compressed natural gas
CO	Carbon monoxide
COHb	Carboxyhaemoglobin
EMA	Environmental Management Authority
ESMAP	Energy Sector Management Assistance Programme
F ₂	Fluorine
Gg	Gigagram
GHG	Greenhouse gas
GORTT	Government of the Republic of Trinidad and Tobago
Hb	Haemoglobin
HC	Hydrocarbons
HNO ₃	Nitric acid
IQ	Intelligence quotient
ISP	Institutional Strengthening Programme
km	Kilometre
LPG	Liquified petroleum gas
m ³	Cubic metre
mg	Milligram
MWH	Mega watt hours
N ₂ O	Nitrous oxide
NGO	Non-governmental organisation
NH ₃	Ammonia
NMVOOC	Non-methane volatile organic compounds
NO	Nitric oxide
NO ₂	Nitrogen dioxide
NO ₃	Nitrate
NO _x	Oxides of nitrogen
O ₃	Ozone
PAH	Polycyclic aromatic hydrocarbons
PAHO	Pan American Health Organisation
PAN	Peroxyacetyl nitrates
Pb	Lead
PM ₁₀	Particulate matter of aerodynamic diameter maximum 10 μm
PM _{2.5}	Particulate matter of aerodynamic diameter maximum 2.5 μm
SO ₂	Sulphur dioxide
SO ₄	Sulphate
SO _x	Oxides of sulphur
SPM	Suspended particulate matter
SVOCs	Semi-volatile organic compounds
TCPD	Town and Country Planning Division
TSP	Total suspended particulates
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
USEPA	United States Environmental Protection Agency
UV-B	Ultraviolet B
UWI	University of the West Indies

VOCs
WHO
m

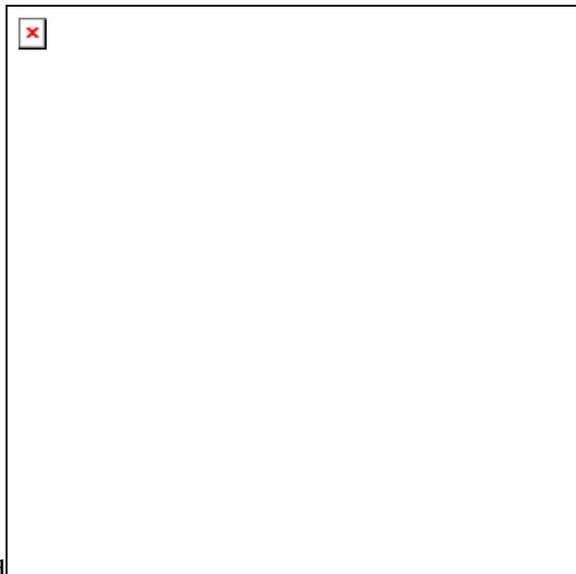
Volatile organic compounds
World Health Organisation
Micrometer

GLOSSARY

Acid deposition. Acid deposition consists of delivery of acidic substances, mainly sulphur and nitrogen oxides, acids and salts, through the atmosphere to the earth's surface. These compounds (principally the oxides) are introduced into the atmosphere as by-products of combustion and industrial activity

Acidification. The decrease of acid neutralizing capacity in water or base saturation in soil caused by natural or anthropogenic processes.

Aerodynamic equivalent diameter. The settling rate of suspended particles and their penetration into the respiratory tract is in accordance with the particle AED, an expression that accounts for the inertial and aerodynamic drag properties of particles. The AED is dependent upon the particle density, shape, and size. The particle AED is defined as the diameter of a smooth, unit density [$\rho = 1$ gram per cubic centimetre (g/cm^3)] sphere having the same terminal settling velocity as the actual particle. The use of the AED enables one to standardise particles of different shapes, smoothness, and densities for direct comparative purposes



Aerosol. A colloid in which solid particles or liquid droplets are suspended in a gas. Smoke is an example of a solid aerosol; fog is an example of a liquid aerosol.

Air inversion. A meteorological condition in the earth's atmosphere in which the temperature of the air some distance above the earth's surface is higher than the air temperature of the surface. Normally, air temperatures decrease progressively as altitude increases. Such a condition traps air and released gases and vapours near the earth's surface, thus impeding their dispersion.

Air pollutant. Any substance in air which could, if in high enough concentration, harm man, other animals, vegetation, or material. Pollutants may include almost any natural or artificial composition of matter capable of being airborne. They may be in the form of solid particles, liquid droplets, gases, or in combinations of these forms. Generally, they fall into two main groups: (1) those emitted directly from identifiable sources; and (2) those produced in the air by interaction between two or more primary pollutants, or by reaction with normal atmospheric constituents, with or without photoactivation.

Air pollution. The contamination of the atmosphere by any toxic or radioactive gases and particulate matter as a result of human activity.

Airway resistance. Pressure drop across airway per unit flow.

Alcohol. An organic compound with a carbon bound to a



hydroxyl group. Examples are methanol, CH_3OH ; ethanol, $\text{CH}_3\text{CH}_2\text{OH}$; propanol, $\text{CH}_3\text{CH}_2\text{CH}_2\text{OH}$.

Aldehyde. Organic compounds with a carbon bound to a $-(\text{C}=\text{O})-\text{H}$ group. Examples are formaldehyde (HCHO), acetaldehyde, CH_3CHO , and benzaldehyde, $\text{C}_6\text{H}_5\text{CHO}$.

Algal bloom. Sudden spurts of algal growth, which can affect water quality adversely and indicate potentially hazardous changes in local water chemistry.



Alkanes. A series of organic compounds with general formula $\text{C}_n\text{H}_{2n+2}$. Alkane names end with -ane. Examples are

propane  (with n=3) and

octane  (with n=8).

Alkene. A compound that consists of only carbon and hydrogen, that contains at least one carbon-carbon double bond. Alkene names end with -ene. Examples are ethylene ($\text{CH}_2=\text{CH}_2$); 1-propene ($\text{CH}_2=\text{CH}_2\text{CH}_3$), and 2-octene ($\text{CH}_3\text{CH}=\text{CH}(\text{CH}_2)_4\text{CH}_3$).

Alkyl-lead compounds. Man-made compounds in which a carbon atom of one or more organic to a lead atom.

Anaerobic. A biological process which occurs in the absence of oxygen.

Anoxic. Conditions where concentration of oxygen is very low (less than 0.1 ml/litre of water).

Anthropogenic. Refers to something originating from humans and the impact of human activities on nature.

Area sources. Sources of air pollutants that are generally small operations, such as gas stations and dry cleaners, which by themselves may not emit very much pollution, but when many area sources are located close together their combined emissions may be of concern.

Aromatics. A type of hydrocarbon, such as benzene or toluene, with a specific type of ring structure. Aromatics are sometimes added to gasoline in order to increase octane. Some aromatics are toxic.

Asthma. A disease characterized by recurrent attacks of dyspnea, wheezing, and perhaps coughing caused by spasmodic contraction of the main airways in the lungs.

Atmosphere. The sum total of all the gases surrounding the Earth, extending several hundred kilometres above the surface in a mechanical mixture of various gases in fluid-like motion. The permanent constituents are molecular nitrogen; 78.1%, molecular oxygen; 20.9%, argon; 0.934%, and approximately 0.036% carbon dioxide. Various other components exist in trace amounts. Not to be under emphasised, these trace components are where the interesting atmospheric chemistry occurs. The atmosphere can also be artificially divided into layers. Example: the troposphere (the layer closest to the earth) and the stratosphere (the layer above the troposphere).

Bioaccumulation. A process where chemicals are retained in fatty body tissue and increase in concentration over time.

Biodiversity. The number and variety of different organisms in the ecological complexes in which they naturally occur. Organisms are organised at many levels, ranging from complete ecosystems to the biochemical structures that are the molecular basis of heredity. Thus, the term encompasses different ecosystems, species, and genes that must be present for a healthy environment. A large number of species must characterise the food chain, representing multiple predator-prey relationships.

Biosphere. A volume including the lower part of the troposphere (as high as living organisms can fly or be lofted) and the surface of the earth including the oceans. This region, by definition, encompasses all the living matter of the earth. Some very important atmospheric chemicals are produced in this region and pass into the atmosphere. This region exchanges chemicals and particulate matter with the atmosphere and soils and waters of the earth.

Bronchi. The hollow branches of the pulmonary tree which connect the trachea to the alveoli.

Bronchitis. Inflammation of the larger air passages of the lungs. Disease or physical or chemical irritants may cause it. Symptoms are generally that of a chest cold and may include in addition chest pain and coughing.

Calcium carbonate (CaCO₃). A chemical compound found in nature as calcite (in limestone, marble, and chalk) and aragonite (in pearls) and in plant ashes, bones, and many shells.

Carbon monoxide (CO). A toxic, odourless, colourless gas produced during fossil fuel or biomass burning. Compound consisting of one carbon and one oxygen. Except for carbon dioxide, it is one of the longest lived naturally occurring atmospheric carbon compounds (this wording is meant to exclude chlorofluorocarbons). The recent change in tropospheric CO content may portend a change in the balance between oxidants and reductants in the atmosphere.

Carboxyhaemoglobin. Haemoglobin in which the iron is bound to carbon monoxide instead of oxygen.

Carcinogenic-. Capable of causing cancer. A suspected carcinogen is a substance that may cause cancer in humans or animals but for which the evidence is not conclusive

Cardiovascular. A term indicating the heart and blood vessels.

Code of good environmental practice. A document to provide guidance to owners and operators of facilities as to the likely environmental impacts associated with the industry and the acceptable methods of control.

Command and control. Specific requirements prescribing how to comply with specific standards defining acceptable levels of pollution.

Compressed natural gas. An alternative fuel for motor vehicles; considered one of the cleanest because of low hydrocarbon emissions and its vapours are relatively non-ozone producing. However, vehicles fuelled with CNG do emit a significant quantity of nitrogen oxides.

Defoliate. Removal of foliage from plants, often by chewing insects.

Dioxins. Family of 75 different toxic chlorinated hydrocarbons formed as by-products in chemical reactions involving chlorine and hydrocarbons, usually at high temperatures.

Dry deposition. Dry deposition is the direct transfer to and absorption of gases and particles by natural surfaces such as vegetation, soil, water or snow.

Economic instrument. A way of influencing the actions of individuals and corporations using methods such as tax credits for certain types of investment or subsidies for certain products.

Ecosystem. The interacting synergism of all living organisms in a particular environment. Every plant, insect, aquatic animal, bird, or land species that forms a complex web of interdependency. An action taken at any level in the food chain, use of a pesticide for example, has a potential domino effect on every other occupant of that system.

Emphysema. An irreversibly diseased lung condition in which the alveolar walls have lost their resiliency, resulting in an excessive reduction in the lungs' capacity.

Environment. The sum of all external conditions affecting the life, development and survival of an organism.

Furans. Organic compounds composed of oxygen and 4 carbons in a ring.

Greenhouse effect. The phenomenon in which outgoing infrared radiation that would normally exit from a planet's atmosphere but instead, is trapped or reflected because of the presence of the atmosphere and its components (see below) is called the greenhouse effect. It has been calculated that this effect is necessary to maintain the earth's climate and surface temperature and, more importantly, the liquid state of water in the majority of the earth's biosphere; however, the best scientific estimates to date suggest that increasing amounts of greenhouse gases are resulting in higher temperatures world-wide. This could result in melting of icecaps that would raise the sea level and cause devastating floods in coastal areas, more extremes in rainfall and intensity, and the distribution of species in the biosphere.

Greenhouse gas. Atmospheric components that absorb strongly in the infrared region of the spectrum. Infrared radiation is reflected and emitted by the earth's surface as heat and causes a fairly large warming effect when trapped by these gases in the atmosphere. In order of abundance and importance as greenhouse gases are water vapour, carbon dioxide, ozone, nitrous oxide, methane, and chlorofluorocarbons (CFCs). Absorption by water vapour, the most common greenhouse gas, explains why many humid or cloudy days feel much hotter than dry, clear days of the same air temperature. Because of these gases, only about 5% of the radiation escapes from the atmosphere while more than 90% is radiated back to the surface of the earth.

Haemoglobin. Protein used by all vertebrates and some invertebrates for oxygen transport because the two substances combine reversibly. In vertebrates it occurs in red blood cells (erythrocytes), giving them their colour.

Halocarbons. Compounds that contain carbon and halogen atoms and (sometimes) hydrogen. The simplest are compounds such as tetrachloromethane (CCl₄), tetrabromomethane (CBr₄).

Halons. Bromine containing compounds with long atmospheric life- times whose breakdown in the stratosphere cause depletion of ozone. Halons are used in fire fighting.

Hydrocarbons. Chemicals containing only carbon and hydrogen. These are of prime economic importance because they encompass the constituents of the major fossil fuels, petroleum and natural gas, as well as plastics, waxes, and oils. In urban pollution, these components--along with NO_x and sunlight--contribute to the formation of tropospheric ozone.

Hydrogen peroxide (H₂O₂). A colourless, rather unstable oxidant with a bitter taste and caustic to the skin. Hydrogen peroxide will decompose, liberating oxygen. Pure hydrogen peroxide is stable, but the slightest impurity will enhance decomposition, often violently. Concentrated solutions of hydrogen peroxide are highly corrosive and toxic. H₂O₂ is used as bleach, deodoriser, and in the manufacturing of rocket fuel. The hydrogen peroxide in your bathroom is approximately 3 percent in water. In the atmosphere this is probably one of the oxidisers for sulphur dioxide in cloud water droplets that produces sulphuric acid, a major component in acid rain.

Incomplete combustion. Part of the carbon is not completely oxidised producing soot or carbon monoxide (CO). Incomplete combustion uses fuel inefficiently and the carbon monoxide produced is a health hazard.

Infrared radiation. Energy that is emitted in the form of electromagnetic waves at a wavelength greater than about 750 up to approximately 30,000 nanometres. Although the earth absorbs almost all the IR, UV, and visible radiation that hits it, the surface of the earth emits only the longest wavelength radiation of these three, IR, in any significant amounts. It is this re-emission of IR towards space--and its subsequent absorbance, re-emission and scattering--that contributes to the process that heats the atmosphere. This re-emission and subsequent heating is a part of the greenhouse effect.

Inhalable particles. All dust capable of entering the human respiratory tract.

Ketones. A molecule that contains a carbonyl carbon covalently bonded to two different carbons.

Lead (Pb). A heavy metal that is hazardous to health if breathed or swallowed. Its use in gasoline, paints, and plumbing compounds has been sharply restricted or eliminated by regulations and US federal laws.

Lesion. An abnormal change, injury, or damage to tissue or to an organ.

Liquefied petroleum gas (LPG). A liquid petroleum fuel. LPG is a mixture of butane and propane, which is gaseous at normal temperature and atmospheric pressure.

Magnesium carbonate (MgCO₃). A carbonate produced in paper by the action of atmospheric carbon dioxide on magnesium hydroxide.

Methane (CH₄). A colourless, odourless, flammable, greenhouse gas. It is the simplest of all hydrocarbons with a formula of CH₄. Methane is released naturally into the air from anaerobic environments such as marshes, swamps, and rice fields, and from symbiotic microbes in the guts of ruminant animals (such as cattle, sheep, and camels), and sewage sludge. Methane is released from methane producing bacteria (methanogens) that live in these anaerobic places.

Mobile sources. Moving objects that release regulated air pollutants, e.g. cars, trucks, buses, planes, trains, motorcycles, and gas-powered lawn mowers.

Morbidity. Rate of incidence of disease.

Mortality. Death rate.

Mucous membrane. The mucous-secreting membrane lining the hollow organs of the body; i.e., nose, mouth, stomach, intestine, bronchial tubes, and urinary tract.

Nitrate. A compound containing nitrogen that can exist in the atmosphere or as a dissolved gas in water and which can have harmful effects on humans and animals.

Nitric acid (HNO₃). A corrosive, non-volatile, and inorganic acid. It is a strong acid (dissociates completely in aqueous solution) and is also an oxidiser. In the atmosphere it is formed by the conversion of nitrogen monoxide into nitrogen dioxide, and ultimately into nitric acid. Nitric acid is highly water-soluble. This solubility with water allows easy removal of nitric acid from the troposphere by atmospheric precipitation. Commonly, this is referred to as acid rain or snow. Nitric acid has a relatively low concentration in the atmosphere but provides an important role in the production of sulphuric acid. It acts as a catalyst in the conversion of sulphur dioxide to sulphuric acid.

Nitrogen dioxide (NO₂). The lesser of the two emitted NO_x gases from high temperature combustion in air. It is an important species in the atmosphere. Since it absorbs in the visible wavelength region--creating the Brown Cloud see over Denver, LA, Mexico City, Beijing, etc.--and can be photolyzed and yield oxygen atoms that can react with molecular oxygen to create ozone, NO₂ and the NO/NO₂ ratio is important in tropospheric chemistry.

Nitrous oxide (N₂O). A by-product of biological activity of a symbiotic bacteria living in leguminous plant roots. It is a principal greenhouse gas that absorbs in the infrared wavelength region and unfortunately falls in an IR "window" between IR absorbing features of water and carbon dioxide (a characteristic of all the "trace" greenhouse gases with significant radiative forcing). It is also laughing gas used in medicine as a gentle general anaesthetic.

Organic compounds. Substances that contain the element carbon, with the exception of carbon dioxide and various carbonates.

Oxides of nitrogen (NO_x). Include NO and NO₂. Mainly produced by microbes in the soil in response to agriculture, but also produced in the ocean, from burning of timber, from fertilisers and from combustion of fossil fuels.

Oxygenates. Compounds containing oxygen in a chain of carbon and hydrogen atoms. They are blended into gasoline in two forms: alcohols or ethers.

Ozone depleting substances. Chemicals that have the potential to deplete the ozone layer, e.g. chlorofluorocarbons (CFCs) and hydrochlorofluorocarbons (HCFCs).

Ozone- (O₃). A molecule that consists of three oxygen atoms bonded together. The ozone layer in the stratosphere absorbs UV radiation and creates a warm layer of air in the stratosphere and is therefore responsible for the thermal structure of the stratosphere. Ozone that is present in the troposphere is mostly a result of anthropogenic pollution and therefore higher concentrations are found in urban areas. Ozone is involved with NO_x in the photochemical production of many of the constituents of pollution environments (see nitrogen oxides and hydroxyl radicals.)

Peroxyacetyl nitrates (PAN). A class of chemical substances found as a pollutant in the troposphere, formed by photolysis from natural and manufactured organic chemicals. These chemicals act as irritants and mutagens in mammals and are toxic to many plants.

pH. The negative logarithm of the hydrogen ion concentration of a solution. It is the quantitative expression of the acidity and alkalinity of a solution and has a scale that ranges from about 0 to 14. pH 7 is neutral; <7 is acidic; and >7 is alkaline.

Photochemical oxidants. Air pollutants formed by the action of sunlight on oxides of nitrogen and hydrocarbons.

Photochemical smog. Natural and artificially emitted hydrocarbons in the presence of oxides of nitrogen undergo photochemical reactions that produce a cloud of toxic chemicals including ozone and a variety of caustic agents. This process is powered by sunlight and some of the products, such as ozone, reach a peak soon after photon flux from the sun reaches a maximum, around midday. The thermal inversions often associated with some cities can lead to a dangerous build-up of smog in urban areas. Human deaths have been attributed to photochemical smog since the Industrial Revolution in cities such as London and New York.

Photosynthesis. Photosynthesis is a biological process that plays a vital role in cycling the atmosphere's carbon dioxide, while simultaneously producing oxygen and other complex substances. Green plants, with chlorophyll, utilise the sun's energy to convert carbon dioxide and water into the plant biomass while oxygen that is released into the atmosphere.

PM₁₀. An air pollutant that consists of particulate matter in ambient air exceeding 10 microns in diameter.

Pneumonia. Inflammatory lung disease caused by microorganisms, virus, and chemical or physical irritants.

Point sources. Stationary locations or fixed facilities such as an industry or municipality that discharge pollutants into air or surface water through pipes, ditches, lagoons, wells, or stacks; a single identifiable source such as a ship or a mine.

Polycyclic aromatic hydrocarbons. A class of very stable organic molecules made up of only carbon and hydrogen. These molecules are flat, with each carbon having three neighbouring atoms. These compounds are known or suspected carcinogens.

Primary air pollutant. A harmful chemical that enters directly into the atmosphere either from human activities or natural processes (such as volcanic eruptions).

Radicals. Highly reactive molecules or atoms with an unpaired electron. The species is often represented by a formula with a single dot as the unpaired electron.

Refrigerant. The compound (working fluid) used in air conditioners, heat pumps, and refrigerators to transfer heat into or out of an interior space. This fluid boils at a very low temperature enabling it to evaporate and absorb heat.

Remediation. Cleanup or other methods used to remove or contain a toxic spill or hazardous materials from a Superfund site; 2. for the Asbestos Hazard Emergency Response program, abatement methods including evaluation, repair, enclosure, encapsulation, or removal of greater than 3 linear feet or square feet of asbestos-containing materials from a building.

Respirable particles. Are those that penetrate into and are deposited in the nonciliated portion of the lung. Particles greater than 10 micrometers aerodynamic diameter are not respirable.

Sahara Dust. Dust from the Sahara Desert in Africa. The dust turns skies around the northeastern Caribbean Sea hazy, reducing visibility and causing poor air quality. Saharan dust blows across the Atlantic a few times most summers, sometimes reaching southern Florida. Dust storms and rising

warm air can lift the fine Saharan sand 15,000 feet or so above the African deserts. Winds carry the dust westward. Larger particles fall out as the dust crosses the Atlantic. But the smaller particles can cause problems an ocean away.

Secondary air pollutant. A harmful chemical that forms in the atmosphere when a primary air pollutant reacts chemically with other air pollutants or natural components of the atmosphere.

Stationary sources. Pollution location that is fixed rather than moving. One point of pollution rather than widespread.

Stratosphere. The thermal atmospheric region of the atmosphere between the troposphere and the mesosphere. The lower boundary of the stratospheric region is marked by the tropopause and begins at approximately 13 kilometres; however, this altitude of the troposphere depends on latitude. The upper limit of the stratosphere is marked by the stratopause at approximately 50 kilometres. The stratosphere is characterised by relatively stable temperatures (between -80 and -50 degrees Celsius) in the lower regions, and begins warming near 20 kilometres, reaching its maximum temperature of approximately 0 degree Celsius at the stratopause. Stratospheric chemistry is of particular interest to scientists because ozone, the principal substance that shields the earth from incoming solar ultraviolet radiation, is found in the stratosphere. It should also be noted that wind currents in the stratosphere are primarily horizontal in nature.

Sulphate. An aerosol that has origins in the gas-to-aerosol conversion of sulphur dioxide; of primary interest are sulphuric acid and ammonium sulphate.

Sulphur dioxide. A colourless gas consisting of a single sulphur atom and two oxygen atoms. Sulphur dioxide is a major primary pollutant in the atmosphere originating mostly from coal fired power plants and other fossil fuels combustion. In the atmosphere, sulphur dioxide is usually oxidised by ozone and hydrogen peroxide to form sulphur trioxide, a secondary pollutant. Sulphur trioxide, similar to sulphur dioxide, is extremely soluble in water. If these sulphur oxides are present in the atmosphere when condensation occurs, droplets of sulphuric acid (acid rain) are formed. Volcanic eruptions provide a natural source of sulphur dioxide in the atmosphere. However the real problem associated with the production of sulphuric acid in the atmosphere is not with the sulphur dioxide expelled by volcanoes. Anthropogenic production of sulphur dioxide, caused by the burning of fossil fuels, is largely responsible for damage caused by acid rain.

Sulphuric acid. In the atmosphere sulphur oxides (see sulphur dioxide) are converted to sulphuric acid, a strong, non-volatile acid. Oxides of sulphur and nitrogen combine with atmospheric moisture to produce acid rain.

Suspended particulate matter. Particles floating in the air with a diameter below 10 μm .

Synergistic effect. Interaction of two or more biotic or abiotic substances or processes with the net effect being greater than the sum of the independent effects of each substance or process.

Tetrachloromethane. A colourless, dense, highly toxic, volatile, non-flammable liquid.

Total suspended particulates. Total particulate matter in a sample of ambient air.

Toxic effects. The physiologic, physical, or laboratory manifestations or derangement's that can be attributed to the presence of a substance within the body.

Trachea. The tube that connects your mouth and nose to your lungs. You can also call it the windpipe. It is in the front of your neck.

1,1,1-Trichloroethane. A colourless man-made chemical which does not occur naturally. In the environment, it can be found as a liquid, as a vapour, or dissolved in water and other chemicals.

Troposphere. The lowest layer of the Earth's atmosphere, ranging from the ground to the base of the stratosphere with an altitude of 10-15 kilometres depending on the latitude. This is where all weather occurs. The word troposphere is derived from the Greek words tropos--turning and sphaeria--sphere.

Ultraviolet radiation. Energy that is emitted in the form of electromagnetic waves with a wavelength of 1-380nm, which is composed of UV-A, UV-B, and UV-C light; UV-A light being the longest wavelength and having the smallest energy and UV-C light being the shortest wavelength and having the highest energy. All UV-C light and most UV-B light are filtered out of the atmosphere via the ozone layer. However, UV-A light travels to the surface of the earth.

Volatile organic compounds. Any organic compound which evaporates readily to the atmosphere. VOCs contribute significantly to photochemical smog production and certain health problems.

Wet deposition. Wet deposition is the transfer of a substance from the atmosphere to the surface of the earth within or on the surface of a hydrometeor (snow, hail or rain).

STATE OF THE ENVIRONMENT REPORT 2000

EXECUTIVE SUMMARY

Over the last few years a growing concern has been expressed in the quality of the air that we breathe. Our atmosphere is all pervasive, and contaminated air affects everyone's health, as well as that of the plants, animals and non-living components of our environment. In this report, the quality of our air, the pollutant emissions to it and the existing policy and institutional mechanisms to control air pollution are examined.

A wide range of pollutants has been identified as the cause of our diminished air quality. These include: particulate matter, sulphur dioxide, oxides of nitrogen, carbon monoxide, ozone, lead, volatile organic compounds, asbestos, ozone depleting substances and greenhouse gases (carbon dioxide, methane, nitrous oxide). Most of these compounds affect human health and many target the respiratory tract. Other affected organs/systems include the oxygen-carrying capacity of the blood, the nervous system, kidneys, cardiovascular and reproductive systems and the numerous other toxic effects produced by the volatile organic compounds. On the other hand, ozone depleting substances and greenhouse gases, are not directly toxic to human beings, but affect the atmospheric processes that are required for life on earth. Ozone depleting substances impair the formation of ozone, decreasing stratospheric ozone levels. This results in an increase in the transmittance of ultraviolet radiation and an increase in skin cancers and cataracts in people. Greenhouse gases contribute to global warming, and so may affect life on earth through climate change and sea level rise.

The sources of air pollutants are varied. Combustion of fossil fuels and incineration of waste material are major sources for a number of ambient air pollutants, including particulate matter, sulphur dioxide, carbon monoxide, carbon dioxide and lead (from leaded gasoline combustion). Volatile organic compounds enter the atmosphere through evaporation of solvents as well as incomplete combustion. Ozone depleting substances are emitted from leaks in refrigeration units, as well as through their use as aerosol propellants and fire-fighting equipment. Asbestos is emitted mainly from friction pads in vehicles, construction materials and insulation. However, not all major sources of air pollution are anthropogenic (man-made).

Measurements of the concentration of some air pollutants show that our air quality compares favourably with international standards. However, estimates of pollution loading by industry and other sectors of the economy give a different picture: namely a general lack of air pollution control technologies and uncontrolled emissions of air pollutants into our environment. Perhaps the main lesson learned from these few studies is that data on ambient air quality and air pollutant emissions are in short supply, and desperately needed. The establishment of a national ambient air quality monitoring network is a major step towards filling the air quality data gap in Trinidad and Tobago. Another important step is the development of an air pollutant inventory, which would provide data on the emission rates of various air pollutants. Long-term, accurate data collection on a number of criteria air pollutants would provide a sound scientific basis for policy and strategy development, as well as compliance measurement and enforcement action.

There is little legislation that directly addresses air pollution from industrial sources, and enforcement is minimal to non-existent. One exception to this state of affairs is the enforcement against vehicle emissions. The advent of the Environmental Police Unit has increased, by more than a factor of five, the number of enforcement proceedings for visible emissions from motor vehicles.

The issue of air pollution control in Trinidad and Tobago is complex, because of the multitude of air pollution sources — from micro business to heavy industry. The 2000 report concludes with a number of priorities for action to improve the quality of our air. These include the establishment of ambient air quality standards, an ambient air monitoring network, and a regular air pollutant inventory to fill the need for accurate air pollutant emission data. Also required is the development and implementation of legislation and standards to control air emissions from all sectors of the economy, from heavy industry to micro business and finally, the development and support of on-going public education programmes, which are vital to achieving success in any air pollution control strategy. It is only through such educational projects that the public can be sensitised to the problems associated with contaminated air, and the ways in which we can prevent further deterioration of our atmosphere.

1.0 INTRODUCTION

Blanketing the earth on which we live is a 480 km thick layer of gases, which forms the atmosphere of our planet and constitutes the transition between the planet's surface and the vacuum of space. This layer, which is casually referred to as air, is made up of nitrogen (78%), oxygen (21%), varying levels of water vapour, argon (0.9%), carbon dioxide (0.03%) and trace amounts of numerous other gases.

Some theorists argue that the atmosphere was formed by planetary degassing, a process in which gases like carbon dioxide, water vapour, sulphur dioxide and nitrogen were vented from the interior of the Earth, by volcanic and other activities. Life forms on Earth, most notably the photosynthesising organisms, have modified the composition of the atmosphere since their evolution. Life on earth has therefore adapted to and created these changes, closing a giant loop of cause and effect.

The composition of the earth's atmosphere has evolved over time and continues to display an inherent dynamism. This is in part due to the very nature of gas molecules and their pervasive ability to absorb energy and move in a random fashion - virtually free from close confining bonding that confines other states of matter. Air moves freely and mixes freely, allowing it to sustain life on our planet, recycle water and other chemicals, and work with the electrical and magnetic forces to produce a climate.

By far one of the most important functions of the atmosphere is its ability to act as an insulator, preventing the earth from experiencing extremes in temperature. The thickest part of this layer lies within 16 km of the earth's surface and has the ability to trap and retain long wave infrared radiation. Further up at the 25 km mark is the area of greatest accumulation of ozone, a molecular entity that has the ability to block the earth from much of the incoming ultra violet radiation from the sun. Thus the atmosphere protects us from the frigid vacuum of space and high-energy radiation.

We do not own nor can we control the air we breathe. We cannot see most of the particles and gas molecules in the air, and as long as it is odour free and colourless, we assume the air is safe. We are however in the process of polluting the air we breathe as a result of our activities. As societies become more developed and sophisticated, man's activities increasingly affect the composition of the atmosphere and thus the quality of the air we breathe.

The atmosphere is therefore a dynamic and fluid medium in the wider environment. It is a common place for deposition and storage of gaseous or particulate waste. It also has the ability to disperse or degrade such waste, and when the amount of waste entering the atmosphere in an area overwhelms this ability, problems result, namely air pollution. The physical components of our biosphere are all important in sustaining life. Water, land and air, together with the energy of the sun create varying environments on our planet to which life adapts, using the energy of the sun and the resources of the earth, air and water to proliferate, reproduce and evolve. In this report, we look specifically at air, delineating the ways in which we pollute it, outlining what we need to do and what has already been accomplished.

Many of the pollutants in the atmosphere have natural as well as human (anthropogenic) sources. The two major types of anthropogenic air pollution sources are stationary and mobile sources. Stationary sources are those that have a relatively fixed location (e.g. factories and industrial plants) while mobile sources are emitters that move from place to place while yielding emissions (e.g. cars). The stationary source category can be further subdivided into point and area sources. Point sources emit pollutants from one or more controllable sites, while area sources generate air pollutants from open areas exposed to the wind (e.g. construction sites, sugar cane burning) or a large number of smaller sources (e.g. dry cleaners and gas stations).

In the case of water and soil pollution there are expensive but feasible alternatives for remediating many types of contamination. Unfortunately once air becomes polluted there is no practical intervention we can make to clean it up. In the work place respirators are often used to filter polluted

air. Some homes even have particulate filtering systems. However most of us are constantly exposed to many air pollutants that can harm us. This illustrates the overwhelming importance that must be placed on air pollution management and prevention.

The following chapters address the effects and common sources of air pollution, and the results of studies on air pollution in Trinidad and Tobago. In addition the legal and administrative framework and some strategies for managing air pollution are discussed.

2.0 MAJOR AIR POLLUTANTS AND THEIR ADVERSE EFFECT ON HUMAN HEALTH AND THE ENVIRONMENT

2.0 Definition of air pollutants and air pollution

An air pollutant is a substance whose presence in the atmosphere is determined to cause or likely to cause harm to human, plant or animal life; to damage man-made materials and structures; to bring about changes in weather or climate; or to interfere with the enjoyment of life or property. They can be produced from both natural and anthropogenic sources. Air pollutants can be classified as primary or secondary, depending on their origin. Primary air pollutants are those that are emitted directly to the atmosphere. Secondary air pollutants are those formed by chemical reactions between other, primary pollutants. Air pollution is brought about when the amount and/or concentration of the air pollutant in the atmosphere are enough to cause adverse effects to human health and the environment.

The amount of pollutants released to the atmosphere by anthropogenic sources is generally associated with the level of economic activity in the area. Meteorological and topographical conditions affect dispersion and transport of these pollutants, which can then result in ambient concentrations that may harm people, structures and the environment. In general, the effects of air pollution on people are most intense in urban centres with significant emission sources, unfavourable dispersion characteristics, and high population densities.

Table 2.1 summarises the major air pollutants, their significant sources and adverse health effects.

2.1 Suspended Particulate Matter - Total Suspended Particulates and PM₁₀

2.1.1 Description

Suspended particulate matter (SPM) is a complex mixture of organic and inorganic substances, present in the atmosphere as both liquids and solids. Particulate matter suspended in air includes total suspended particulates (TSP), PM₁₀ and PM_{2.5} - particulate matter of aerodynamic diameter of maximum 10 µm and of 2.5µm respectively. Some examples of these fine and ultrafine particles include diesel exhaust, fly-ash, mineral dusts, metal dusts and fumes, acid mists, pesticide mists, carbon black and oil smoke.

A wide range of terminology is applied to particulate matter, reflecting measuring methods (e.g. "total suspended particulates", "black smoke"), site of deposition in humans (e.g. "inhalable", "thoracic particles"), or physical characteristics (e.g. "PM₁₀" and "PM_{2.5}"). Total suspended particulates (TSP) consist of airborne particulate matter of diameter less than 100 µm (Stokes equivalent diameter), as determined by a standard method. Both PM₁₀ and PM_{2.5} are suspended inhalable and respirable particles.

Particulate matter may exist as either a primary or secondary air pollutant.

TABLE 2.1

MAJOR AIR POLLUTANTS AND THEIR ADVERSE HEALTH EFFECTS

AIR POLLUTANT	MAJOR ANTHROPOGENIC SOURCES	ADVERSE HEALTH EFFECTS
Suspended Particulate Matter: Total suspended particulates (TSP); Particulate matter of aerodynamic diameter of maximum 10 µm (PM ₁₀)	Combustion of fossil fuels, including fuel in motor vehicle engines; Industrial activities - stone crushing, mining, metallurgical processes, cement manufacturing; Agro-industrial processes; Road traffic.	Respiratory system effects such as coughing, runny nose, sore throat; Associated with respiratory diseases such as pneumonia, asthma, bronchitis. Unable to define a threshold below which no health effects occur.
Sulphur dioxide (SO ₂)	Combustion of fuels containing sulphur; Smelting non-ferrous ores; Incineration of refuse	Associated with reduced lung function – changes in lung function of asthmatics at 1000 µg/m ³ , exacerbation of respiratory systems in sensitive individuals from 100 to 250 µg/m ³ increased incidence of respiratory symptoms and diseases and premature mortality.
Nitrogen dioxide (NO ₂)	Combustion of fossil fuels from stationary sources (heating, power generation) and transport (motor vehicles) sources; Incineration; Industrial processes - welding, nitric acid manufacture	Slight changes in lung function in asthmatics at 365 to 565 µg/m ³ ; Increased susceptibility to respiratory infection, and decreased pulmonary function
Carbon monoxide (CO)	Incomplete combustion of carbonaceous fuels (in industrial processes and motor vehicles)	Forms carboxyhaemoglobin (COHb) which lowers O ₂ in blood – critical level of COHb approx, 2.5% . Health effects related to COHb levels. Impaired learning ability, manual dexterity and mental judgement; Coma and convulsions, death.
Ozone (O ₃)	Secondary pollutant. O ₃ precursors are VOCs and oxides of nitrogen	Respiratory function responses – eye and nose irritant.
Lead (Pb)	Lead in gasoline; Processing of lead and lead containing ores; Lead-acid batteries; Incineration.	Critical level of Pb in blood is 25 µg Pb /L; affects nervous system, blood forming system, kidneys, cardiovascular and reproductive systems; in children, lowers IQ, hyperactivity
Volatile Organic Compounds (VOCs) Includes some hydrocarbons (HC)	Evaporation of gasoline and other fuels; Incomplete combustion of fuels; Evaporation of solvents.	Health effects are compound-specific. Some VOCs are proven or potential carcinogens.

2.1.2 Major sources

Particulate matter is emitted from a wide range of natural and anthropogenic sources. Natural sources include: Sahara dust incursions (usually in the months of April to November), volcanic or other geothermal eruptions, forest and bush fires, sea salt, windblown soil and dust, and pollen. Particulate matter from natural sources tends to be coarse.

Major anthropogenic sources of primary particulate matter include: fossil fuel-based thermal power plants, metallurgical processes, cement manufacturing, mining, stone crushing, flour milling, burning of fossil fuels including fuel combustion in automotive engines (exhaust emissions), heating and household cooking, agricultural field burning, incineration and other burning of wastes, and vehicular traffic. Particulate matter generated from combustion tends to be fine, while agro-industrial processes and road traffic (i.e. grinding of concrete, asphalt and tyres) contribute mostly coarse particulate emissions.

Secondary particulate matter can also be formed by the transformation of gaseous emissions. Reactions between substances such as oxides of sulphur, oxides of nitrogen, and volatile organic compounds (VOCs) including hydrocarbons (HC) can produce particulate matter.

2.1.3 Human health effects

Health effects of suspended particulate matter in humans depend on particle size and concentration, and can fluctuate with daily fluctuations in PM_{10} or $PM_{2.5}$ levels. In nasal breathing, particulate matter greater than $10\ \mu\text{m}$ is deposited and removed in our noses and throats (extrathoracic part of the respiratory tract) with very few particles getting into the trachea or bronchi. Particles in the size 5 to $10\ \mu\text{m}$ are mostly removed in the trachea and bronchi and do not get into the lungs. Particles smaller than 3.5 to $2.5\ \mu\text{m}$ present a larger health concern because these particles can evade the human body's respiratory defence system and reach the lung tissue, where it can remain imbedded for years, or in the case of soluble particles, be absorbed into the blood stream.

Particulate matter and sulphur dioxide often occur together in ambient air and may have synergistic effects with other pollutants.

Short-term health effects of exposure to combined sulphur dioxide, black smoke and particulate matter include: increased mortality, morbidity and deficits in pulmonary function. Some of the "lowest-observed effect" levels for short term exposure to particulate matter are: excess mortality – $500\ \mu\text{g}/\text{m}^3$ (smoke), increased acute respiratory morbidity in adults – $250\ \mu\text{g}/\text{m}^3$ (smoke); decline in lung function in children – $180\ \mu\text{g}/\text{m}^3$ (total suspended particulates), and $110\ \mu\text{g}/\text{m}^3$ (thoracic particles).

The adverse health effects are associated with coughing and respiratory diseases such as pneumonia, asthma, and bronchitis.

The World Health Organisation (WHO) has reported that current epidemiological studies on the health effects of particulate matter are unable to define a threshold below which no effects occur; even at low levels of particulate matter (less than $100\ \mu\text{g}/\text{m}^3$), short term exposure is associated with health effects. Hence, no guideline value for short-term average concentrations in ambient air has been recommended by WHO (WHO 1999).

With respect to long term effects of particulate matter on health, some studies have suggested that long term exposure is associated with reduced survival, and a reduction of life expectancy in the order of 2 to 3 years. Other recent studies have shown that the prevalence of bronchitis symptoms in children, and of reduced lung function in both children

and adults are associated with particulate matter exposure. For this reason, no guideline value for long term average concentrations in ambient air has been recommended by WHO (WHO 1999).

It should be noted that exposure to air pollutants and especially particulate matter, may give rise to feelings of discomfort, which may cause annoyance.

Table 2.2 summarises the WHO guidelines for a number of ambient air contaminants, including suspended particulate matter.

2.1.4 Other environmental effects

Large-size particulate matter falls out of the atmosphere based on its settling characteristics and atmospheric conditions (especially wind). Particulate matter that settles out of the air adversely affects people's welfare by accumulating virtually anywhere - on buildings, windows, cars, laundry, even inside houses - leaving dirty deposits, requiring frequent cleaning, and damaging some materials.

Particulate matter that remains suspended in the air is of a small size that can reduce visibility. Other environmental effects of particulate matter include potential modification of climate and contribution to acid deposition.

2.2 Sulphur Dioxide

2.2.1 Description

Sulphur dioxide (SO₂) is a colourless gas and is the predominant form of oxides of sulphur (i.e. compounds of sulphur and oxygen molecules) found in the lower atmosphere. When present in the atmosphere at concentrations in the range of 1000 to 3000 µg/m³, it can be detected by taste and smell. At concentrations of 10 000 µg/m³, it has a pungent, unpleasant odour.

SO₂ dissolves readily in water present in the atmosphere to form ultimately, sulphuric acid. This is generally present as an acid aerosol, often associated with other pollutants in droplets or solid particles of a wide range of sizes. The sulphuric acid is finally removed from the atmosphere by either wet or dry deposition.

2.2.2 Major sources

The most significant natural source of SO₂ is volcanic eruptions.

The major anthropogenic sources of SO₂ are the burning of fuels containing sulphur, petroleum refining, smelting non-ferrous ores (mainly copper, lead, nickel and zinc), manufacture of sulphuric acid, conversion of wood pulp to paper, incineration of refuse, and production of elemental sulphur.

2.2.3 Human health effects

In general, exposure to sulphur dioxide in the ambient air has been associated with reduced lung function, increased incidence of respiratory symptoms and diseases, irritation of the eyes, nose and throat, and premature mortality. Children, the elderly, and those already suffering from respiratory ailments, such as asthmatics, are especially at risk. Epidemiological studies indicate the following effects after short-term SO₂ exposures: possible small reversible declines in children's lung function (250 to 450 µg/m³); aggravation of bronchitis (about 500 µg/m³); increased mortality (500 to 1000 µg/m³).

Sulphuric acid and other sulphates also have human health effects. Respiratory effects have been reported for concentrations of sulphuric acid ranging from 350 to 500 $\mu\text{g}/\text{m}^3$. The lowest-demonstrated-effect level is 100 $\mu\text{g}/\text{m}^3$ for exercising adolescent asthmatics. High concentrations of SO_2 (greater than 1000 $\mu\text{g}/\text{m}^3$) together with suspended particles are believed to have been responsible for high mortality levels during the London smog event of 1958.

The WHO health based guidelines for SO_2 are presented in Table 2.2.

2.2.4 Other environmental effects

Sulphur oxide emissions cause adverse impacts to vegetation, including forests and agricultural crops. Some studies in the United States and elsewhere have shown that plants exposed to high ambient concentrations of sulphur dioxide may lose their foliage, become less productive, or die prematurely (World Bank 1998). Trees and other plants exposed to wet and dry sulphuric acid depositions at some distance from the source of emissions may also be damaged. Impacts on forest ecosystems vary greatly according to soil type, plant species, atmospheric conditions, insect populations, and other factors that are not well understood.

Acid depositions can damage freshwater lake and stream ecosystems by lowering the pH of the water. Acidification also decreases the species variety and abundance of other animal and plant life.

Sulphate aerosols, converted from sulphur dioxide in the atmosphere, can reduce visibility by scattering light. In combination with warm temperatures, abundant sunlight, high humidity, and reduced vertical mixing, such aerosols can contribute to haziness extending over large areas.

Sulphur dioxide emissions may affect building stone, and ferrous (iron and steel) and non-ferrous metals, such as zinc and copper. Acids in the form of gases, aerosols, or precipitation may chemically erode building materials such as marble, limestone and dolomite. Of particular concern is the chemical erosion of historical monuments and works of art.

2.3 Nitrogen Dioxide

2.3.1 Description

Nitrogen dioxide (NO_2) is a reddish brown gas with a pungent odour; it is a strong oxidant and soluble in water. It is the most predominant form of the oxides of nitrogen (NO_x) existing in ambient air; the other oxides of nitrogen include nitric oxide (NO), nitrous oxide (N_2O) (which is classified as a greenhouse gas). Most anthropogenic NO_2 derives from emissions of NO . NO is readily converted to the much more harmful nitrogen dioxide by chemical reaction with ozone present in the atmosphere. Because this transformation occurs quite rapidly, NO_2 is generally regarded as being more important from the point of view of human health.

In the atmosphere, NO_2 may be involved in a series of reactions (in the presence of ultraviolet radiation) that produce photochemical smog, reducing visibility. It may also react with moisture in air to form nitric acid (HNO_3) aerosols. Most HNO_3 is then removed from the atmosphere by wet deposition, and to a lesser extent, by dry deposition.

In the lower atmosphere (troposphere) NO_2 forms ozone by reacting with hydrocarbons.

2.3.2 Major sources

On a global scale, natural emissions of nitrogen oxides far outweigh anthropogenic emissions. These natural emissions result primarily from lightning, volcanic eruptions and bacterial action in soil. These give rise to low level background atmospheric emissions.

Anthropogenic emissions are mainly due to fossil fuel combustion from both stationary sources (heating, power generation) and transport (internal combustion engines – exhaust emissions), and from incinerators. Other atmospheric contributions come from non-combustion processes such as: nitric acid manufacture, welding processes and the use of explosives. According to one study by Godish (1991) quoted in a World Bank report (World Bank 1998), only about 10% of all NO_x emissions come from anthropogenic sources.

2.3.3 Human health effects

NO₂ is an irritating gas that is absorbed into the mucous membrane of the respiratory tract. Generally, exposure to NO₂ is linked with increased susceptibility to respiratory infection, increased airway resistance in asthmatics, and decreased pulmonary function. Short-term exposure to NO₂ has been associated with a wide range of lower respiratory illnesses in children (cough, runny nose, and sore throat are among the most common), as well as increased sensitivity to urban dust and pollen.

A variety of respiratory system effects have been reported to be associated with exposure to short- and long- term NO₂ concentrations of less than 3.8 mg/m³ in humans and animals. These include: altered lung function and increased prevalence of acute respiratory illness and symptoms observed in controlled human exposure studies and community epidemiological studies; and lung tissue damage, development of emphysema-like lesions in the lung, and increased susceptibility to infection observed in animal toxicology studies.

Adverse effects to human pulmonary function due to single, short-term exposure (less than 3 hours duration) to NO₂ have been unambiguously demonstrated, but only for concentrations greater than 1.9 mg/m³. This value is well in excess of ambient exposure levels typically encountered by the public.

2.3.4 Other environmental effects

Strong evidence suggests that NO_x can harm the environment through nitrate formation and acidification of surface waters, damaging freshwater lake and stream ecosystems. Acid depositions can lower the pH of the water, with potentially serious consequences for fish, other animal, and plant life. Lakes in areas with soils containing only small amounts of calcium or magnesium carbonates that could help neutralise acidified rain are especially at risk. Few fish species can survive the sudden shifts in pH (and the effects of soluble substances) resulting from atmospheric depositions and runoff of contaminated waters; affected lakes may become completely devoid of fish life. Acidification also decreases the species variety and abundance of other animal and plant life.

The atmospheric deposition of nitrogen oxides is a substantial source of nutrients that damage estuaries by causing algal blooms and anoxic conditions.

Emissions of nitrogen oxides are a precursor of ground-level ozone, which is potentially a more serious problem. Elevated ozone concentrations in the troposphere (lower atmosphere) can contribute to reductions in crop yields.

Nitrogen oxides can also combine with photochemical oxidants to form smog, which reduces visibility.

2.4 Carbon Monoxide

2.4.1 Description

Carbon monoxide (CO) is a colourless, odourless, tasteless gas.

2.4.2 Major sources

Carbon monoxide is emitted by natural and anthropogenic sources. Natural ambient concentrations of CO range between 0.01 to 0.23 mg/m³ (WHO 1999). Anthropogenic sources form CO from incomplete combustion of carbonaceous fuels in motor vehicles, heating and industrial facilities, thermal power plants, and incinerators.

2.4.3 Human health effects

CO absorbed through the lungs reduces the blood's capacity to transport available oxygen to the tissues. CO bonds with haemoglobin (Hb) to form carboxyhaemoglobin (COHb), which lowers the oxygen level in blood. The consequent reduced oxygen availability can give rise to a wide range of health effects.

The relationship between ambient CO concentrations in air and COHb levels in blood depends on a number of factors. The major factors are the duration of exposure and the pulse rate of the exposed person (that is, the intensity of physical effort), as well as the rate of CO uptake. Body size, lung condition of the exposed person, and barometric pressure influence the rate of CO uptake.

The health effects of CO are usually related to blood levels of COHb expressed as a percentage. Under normal conditions, the COHb concentration in the body is about 1.2 to 1.5 %. The "no-observed-effects" level is about 2% COHb, which can be related to an 8-hour exposure (moderate activity) to 15 to 20 mg/m³ of CO in the atmosphere.

Certain neuro-behavioural effects can be expected at about 5% COHb (moderate activity for 8 hours at 40 mg/m³) that can be related to observable ambient concentrations. These include: impaired learning ability, reduced vigilance (i.e reduced ability to detect small changes in the subject's environment), decreased manual dexterity, impaired performance of complex tasks, and disturbed sleep activity.

An exposure to concentrations of 45 mg/m³ of CO for more than two hours adversely affects a person's ability to make judgements. Two to four hours of exposure at 200 mg/m³ raises the COHb level in the blood to 10 to 30% and increases the possibility of headaches. Exposure to 1000 mg/m³ raises the COHb level in blood to more than 30% and causes a rapid increase in pulse rate leading to coma and convulsions. One to two hours of exposure at 1830 mg/m³ results in 40% COHb in blood, which may cause death.

Individuals most at risk to the effects of CO include those with existing cardiovascular or chronic respiratory problems, the elderly, young children and foetuses. The synergistic effect of CO with other pollutants promotes illness in people with respiratory problems.

2.4.4 Other environmental effects

There are few, if any, other significant environmental effects of exposure to CO. Plants both produce and metabolise CO and are only harmed by prolonged exposure to very high levels.

2.5 Ozone

2.5.1 Description

Ozone (O₃) is a pale blue gas with a characteristic smell. It is a reactive oxidant gas that is a major constituent of atmospheric smog. Ozone is a secondary air pollutant, that is, it is not emitted directly into the atmosphere, but rather it is formed in the atmosphere as a result of chemical reactions that involve primary pollutants.

Ground level ozone is formed in the air by the photochemical reaction of sunlight and nitrogen oxides (NO_x), facilitated by a variety of volatile organic compounds (VOCs), which are photochemically reactive hydrocarbons.

Ozone concentrations are influenced by the intensity of solar radiation, the absolute concentrations of NO_x and VOCs, as well as their relative ratio. Diurnal and seasonal variations occur in response to changes in sunlight. In addition, ground-level ozone accumulation occurs when sea breezes cause circulation of air over an area or when temperature-induced air inversions trap the compounds that produce smog.

2.5.2 Major sources

There is no direct emission of O₃ to the atmosphere. Most of the O₃ in the troposphere (lower atmosphere) is formed indirectly by the action of sunlight on nitrogen dioxide. The precursors of ground-level ozone are emitted by both natural and anthropogenic sources. Volatile organic compounds (VOCs) occurring naturally due to emissions from trees and plants may account for as much as two thirds of ambient VOCs in some locations. Anaerobic biological processes, lightning, and volcanic activity are the main natural contributors to atmospheric NO_x.

Motor vehicles are the main anthropogenic sources of the ground-level ozone precursors of hydrocarbon and NO_x. Other anthropogenic sources of VOCs include emissions from the chemical and petroleum industries and from organic solvents in small stationary sources such as dry-cleaners. Significant amounts of NO_x originate from the combustion of fossil fuels in power plants and industrial processes.

About 10 to 15% of tropospheric O₃ is transported from the stratosphere where it is formed by the action of ultraviolet radiation on oxygen. In addition to O₃, photochemical reactions produce a number of oxidants including peroxyacetyl nitrates (PAN), nitric acid and hydrogen peroxide, fine particulates and an array of short-lived radicals. As a result of the various reactions that take place in the atmosphere, O₃ tends to build up downwind of urban centres, where most of the NO_x is emitted from motor vehicles.

2.5.3 Human health effects

Short-term adverse health effects of ozone have been observed from hourly exposures to ozone concentration as low as 200 µg/m³. These effects include eye, nose and throat irritation, coughing, throat dryness, thoracic pain, increased mucous production, chest tightness, and nausea. Pulmonary function decrements in children and young adults have been reported at hourly average ozone concentrations in the range of 160 to 300 µg/m³, as well on long term exposure to ozone. The synergistic effects of ozone and other pollutants (sulphates and nitrogen dioxide) have been reported. Also, there is no reported threshold value for ozone.

Evidence suggests that exposure to short-term peak concentrations of ground-level ozone damages human health but that these impacts are relatively mild and reversible at ground-level ozone levels exceeding current WHO guidelines (120 µg/m³ over 8 hours). The current WHO guidelines for O₃ and other air pollutants are listed in Table 2.2.

2.5.4 Other environmental effects

Elevated ground-level ozone exposures affect agricultural crops and trees, especially slow-growing crops and long-lived trees. Ozone damages the leaves and needles of sensitive plants, causing visible alterations such as defoliation and change of leaf colour.

In addition to physiological damage, ground-level ozone may cause reduced resistance to fungi, bacteria, viruses, and insects, reducing growth and inhibiting yield and reproduction.

These impacts on sensitive species may result in declines in agricultural crop quality and the reduction of biodiversity in natural ecosystems.

It should be borne in mind, that ground-level ozone is part of a complex relationship among several air pollutants and other factors such as climatic and meteorological conditions and nutrient balances.

2.6 Lead

2.6.1 Description

Lead (Pb) is a grey-white, soft metal with a low melting point, a high resistance to corrosion, and poor electrical conducting capabilities. It is highly toxic.

Most lead in ambient air is in the form of fine particles with an aerodynamic diameter of less than 10 μm . Ambient air also contains organic lead compounds as gases.

2.6.2 Major sources

Lead is naturally available in all environmental media in small concentrations. From the atmosphere, lead is transferred to soil, water, and vegetation by dry and wet deposition. Lead binds strongly to soil, with a half-life of several hundred years. Natural atmospheric lead concentrations are estimated to be in the range of 0.00005 $\mu\text{g}/\text{m}^3$. Urban concentrations are around 0.5 $\mu\text{g}/\text{m}^3$.

Mining, smelting and processing of lead and lead-containing metal ores generate the greatest part of lead emissions from stationary sources. In addition, the combustion of lead-containing wastes and fossil fuels in incinerators, as well as power plants, industries, and households release lead into the atmosphere.

As a result of the extensive use of alkyl-lead compounds as fuel additives ("anti-knock" additives), vehicular traffic is the largest source of atmospheric lead in many urban areas, where leaded gasoline is still used, accounting for as much as 90% of all lead emissions into the atmosphere.

Lead-based paint and dust contaminated by such paint represent significant sources of human exposure to lead in several countries. Lead-acid batteries contribute to the contamination of all environmental media during their production, disposal, and incineration. Lead compounds may also be used as stabilisers in plastics. Other lead-based products include food-can solder, ceramic glazes, crystal glassware, lead-jacketed cables, ammunition and certain cosmetics.

2.6.3 Human health effects

Human exposure to lead is primarily through ingestion and inhalation. Children up to about six years of age constitute the population group at the highest risk from lead exposure through ingestion. Lack of essential trace elements such as iron, calcium, zinc and vitamin C and D, and poor nourishment may increase the absorption of lead by the human body.

Inhalation poses the highest risk of exposure to environmental lead in adults. Inhaled airborne lead represents a relatively small part of the body burden in children. WHO defines a critical level of lead in blood at 100 $\mu\text{g}/\text{L}$. WHO also advises that it appears that 1 μg of lead per cubic metre of air directly contributes approximately 19 $\mu\text{g}/\text{L}$ of blood in children and about 16 $\mu\text{g}/\text{L}$ of blood in adults. Table 2.2 gives the WHO health-based guidelines for lead in the atmosphere, along with other air pollutants.

Lead affects several organs of the human body, including the nervous system, the blood-forming system, the kidneys, and the cardiovascular and reproductive systems. Of most concern are the adverse effects of lead on the nervous system of young children: reducing intelligence and causing attention deficit, hyperactivity, and behavioural abnormalities.

Adult women of reproductive age are also a high-risk group because lead levels of pregnant women are closely correlated with those of newborns. People who are exposed to lead on the job, such as traffic police inhaling airborne lead particles, also suffer adverse health effects. Among adults lead levels in blood are linked to an increased incidence of high blood pressure.

There is evidence to show that persons exposed to large quantities of lead store it in their bones and this lead may leach into their blood long after the exposure. Pregnant women can expose their foetus to lead based on their own exposure as children.

2.6.4 Other environmental effects

Terrestrial and aquatic plants show a strong capability to bioaccumulate lead from water and soil in industrially contaminated environments. Lead can also be taken up by grazing animals, thus entering the terrestrial food chain.

2.7 Volatile Organic Compounds

2.7.1 Description

Volatile organic compounds (VOCs) comprise a very wide range of individual substances, including hydrocarbons (alkanes, alkenes, and aromatics), halocarbons (e.g. trichloroethylene) and oxygenates (alcohols, aldehydes and ketones.) All are organic compounds of carbon and are of sufficient volatility to exist as a vapour in the atmosphere.)

2.7.2 Major sources

VOCs are probably the second most widespread and diverse class of emissions after particulate matter. The variety of sources is quite large and the specific sources vary greatly for the individual compounds.

Hydrocarbons arise substantially from gasoline evaporation and incomplete combustion and from leakage of fuel from distribution systems. Oxygenates arise in vehicle exhaust and are also formed in atmospheric chemical reactions. Evaporation of solvents, used for example in paints, or industrial degreasing processes, causes the release of hydrocarbons, oxygenates and halocarbons to the atmosphere.

Certain VOCs are also naturally occurring. For example, toluene, the most prevalent hydrocarbon in the troposphere, is emitted from vegetation, petroleum seeps and coal deposits.

2.7.3 Human health effects

No generalisations on the health effects of VOCs as a group can be made, as health effects are compound-specific. Some VOCs are of significant toxicity and are proven or potential carcinogens. For example, benzene, (found in the exhaust emissions of motor vehicles from combustion of fuel) has toxic and carcinogenic effects. Also, another group of compounds, polycyclic aromatic hydrocarbons (PAHs) are semi-volatile organic compounds (SVOCs), and are mutagenic and carcinogenic.

2.7.4 Other environmental effects

Many VOCs are of significance in relation to their environmental effects, particularly their contribution to secondary pollutant formation and to stratospheric ozone depletion. VOCs also contribute indirectly to formation of atmospheric acidity.

2.8 Ozone Depleting Substances

2.8.1 Description

While ground level ozone in the troposphere is a pollutant resulting in human health, environmental and global warming effects, stratospheric ozone is vital to life on earth. It acts as an umbrella, filtering out the sun's harmful ultraviolet rays.

Ozone depleting substances (ODSs) are a wide variety of man-made compounds that react with and destroy the stratospheric ozone in the presence of sunlight. The following ODSs have been identified as being used in Trinidad and Tobago:

CFC-11	mainly used for servicing large centrifugal air-conditioning systems, as a propellant for aerosols and in the manufacture of rigid polyurethane foams;
CFC-12	mainly used in the manufacture and servicing of domestic refrigerators, mobile air-conditioners, central air-conditioning systems and as a propellant for aerosols;
CFC-113	used in small quantities to clean printed circuit boards and in the servicing of biomedical equipment;
CFC-114	used as a propellant for aerosols;
CFC-115	imported as part of the refrigerant R-502 and used in low-temperature refrigeration such as cold storage rooms and by food processors;
Halon 1211	used in portable fire extinguishers;
Halon 1301	used in fixed flooding fire protection systems mainly in computer rooms and telephone exchanges;
Tetrachloro- methane	used as a solvent in a number of laboratories; and
1,1,1- Trichloro- ethane	used as a metal cleaner in large engineering workshops and laboratories and also as a paint stripper.

2.8.2 Major Sources

ODSs are leaked or intentionally released into the atmosphere from air-conditioners and refrigerators during repair and maintenance or after disposal. Other ODSs are released during use.

2.8.3 Human Health Effects

Though ODSs themselves have little to no direct human health effects, the increase in UV-B radiation reaching the earth as a result of their release certainly do. Increased UV-B

exposure has been linked to skin cancers, increased vulnerability to infectious diseases and cataracts.

2.8.4 Other Environmental Effects

Increased UV-B levels can also alter the life cycle of plants and result in crop damage. In the ocean, scientist have found that UV-B radiation interferes with the photosynthesis of plankton, the base of the marine food chain, it has caused mutations in some marine organisms and harmed the eggs of others (Steger and Bowermaster 1990).

2.9 Greenhouse Gases

2.9.1 Description

The temperature of the earth is regulated by the atmosphere, which has the ability to block heat from the sun and at the same time trap a certain amount of heat around the earth's surface. Greenhouse gases are those which increase the ability of the atmosphere to trap heat in the atmosphere. Greenhouse gases include carbon dioxide and a wide range of others such as methane, chloroflorocarbons, nitrous oxide and tropospheric ozone.

2.9.2 Major Sources

Energy production, transportation, forest fires and decomposition of garbage are some of the main sources of the greenhouse gases carbon dioxide and methane. The major sources of N₂O are natural, and include lightening, volcanic eruptions and the action of soil bacteria. Chlorofluorocarbons are emitted during the repair and operation of refrigeration equipment.

The world is not only producing more greenhouse gases, the capacity to process the main greenhouse gas, carbon dioxide, by photosynthesis is being lost through deforestation.

2.9.3 Environmental Effects

The presence of greenhouse gases in ever increasing concentrations produces the greenhouse effect, the main effect of which is a rise in the temperature of the earth's surface. Environmental effects that result from this global warming are poorly understood. An increase in temperature may cause a rise in sea level. This can have diverse consequences: flooding, salt-water intrusion in wetlands and ground-water supplies and the destruction of crowded coastal communities.

Other possible effects are changes in weather patterns and increased incidence of hurricanes and droughts. Reduced dissolved oxygen in water and increase in the range of infectious diseases are also likely.

Table 2.2

W.H.O. HEALTH-BASED GUIDELINES FOR CERTAIN AIR POLLUTANTS

Compound	Health endpoint	Observed Effect Level ($\mu\text{g}/\text{m}^3$)	Uncertainty Factor	Guideline Value ($\mu\text{g}/\text{m}^3$)
Particulate Matter	No safe level can be defined.			
Sulphur Dioxide	Changes in lung function in asthmatics.	1000	2	500
	Exacerbation of respiratory symptoms in sensitive individuals.	250	2	125
		100	2	50
Nitrogen Dioxide	Slight changes in lung function in asthmatics.	365-565	0.5	200
Carbon Monoxide	Critical level of COHb <2%	n.a.	n.a.	100 000 60 000 30 000 10 000
Ozone	Respiratory function responses	n.a.	n.a.	120
Lead	Critical Level of Pb in blood: <25 μg of Pb per litre of blood	n.a.	n.a.	0.5

3.0 GENERAL ASSESSMENT OF THE AIR POLLUTION PROBLEM IN TRINIDAD AND TOBAGO

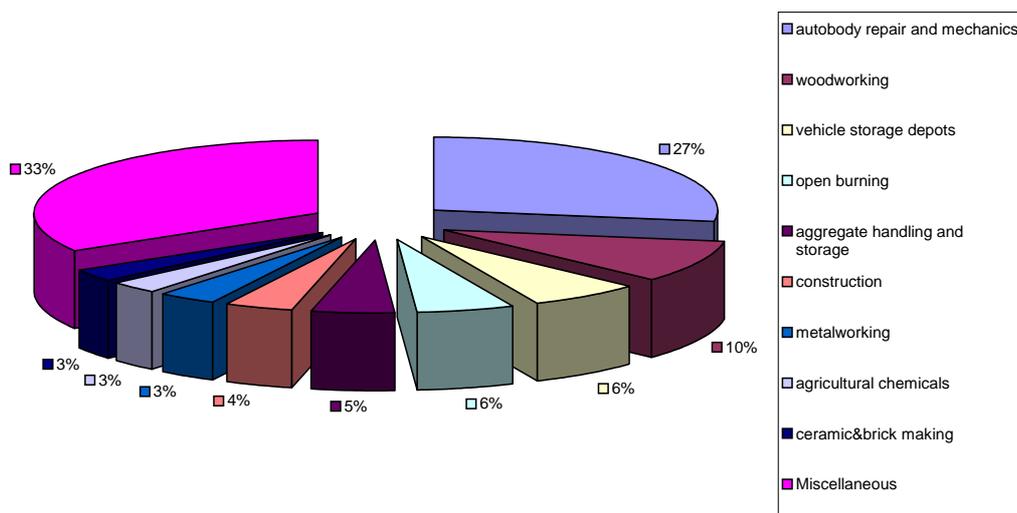
3.0 Ambient Air Quality Assessment

The fact that we are a small twin island state under the influence of the North East Trade Winds for most of the year does not preclude us from having the periodic air pollution episodes that are a common feature for larger and more industrialised countries. Advisories issued by the Meteorological Office at Piarco are sometimes used to inform the public about impending events that may lead to reduced atmospheric visibility (e.g. Sahara dust visitation in combination with severe bush fires). This is especially so in the months of April – November when Sahara dust is most frequent and can cause a marked reduction in atmospheric visibility (3-4 km) that may last a few days or as much as 20 days from back-to-back episodes (Personal Communication, Meteorological Service). This seasonal phenomena which also occurs for part of the dry months (January to May) can produce very hazy conditions in localised areas that are experiencing severe bush fires.

Although there are no permanent air quality monitoring networks for the country to inform and track trends on particular pollutants, there have been two synoptic ambient studies done to date on PM₁₀. The first was conducted in 1998, and was a collaborative effort among the EMA, the United States Environmental Protection Agency (USEPA) and the Pan American Health Organisation (PAHO) with the assistance of the University of the West Indies, St. Augustine (UWI). The second was conducted in 1999 by the Town and Country Planning Division (TCPD) on behalf of the Government of the Republic of Trinidad and Tobago (GORTT).

The first PM₁₀ study, entitled "Suspended Particulate Matter Concentrations along the East-West Corridor, Trinidad, W.I." (Rajkumar and Siung Chang, 2000) was conducted in 1998. The air quality-monitoring programme was designed to collect PM₁₀ samples over a six-week period from a network of 18 stations along the populated east-west urban corridor in Trinidad. The results showed that the daily maximum PM₁₀ concentrations approached the USEPA 24-hour ambient standard (150 µg/m³) only on days when Sahara dust was present in the atmosphere. The mean levels of PM₁₀ ranged between 46 – 88 µg/m³, with the higher mean levels reflecting the proximity of these stations to heavy road traffic, an important source of airborne particulate matter. Median values obtained from the study during non-Sahara dust periods have been extrapolated to show the likely contribution of vehicular traffic and roadside dust to ambient PM₁₀ concentrations in Trinidad. The results show that vehicular traffic and roadside dust contribute only about 30 – 40 µg/m³, which suggests that during Sahara dust episodes a significant portion of the PM₁₀ concentration in the air can be attributed to this phenomena. Although the study was only for a six-week duration, the relationship between PM₁₀ and Sahara dust is an important one, especially when consideration is being given to setting ambient standards at the national level.

The other ambient monitoring programme was executed by the TCPD. This project was split into three phases; the third being the data collection program. This phase included actual measurements of air quality parameters (NO_x, SO_x, VOCs, TSP/PM₁₀/PM_{2.5}, NO₃ in TSP, SO₄ in PM_{2.5} and metals in PM₁₀) in the study areas of Point Lisas (2 stations) and Chaguaramas (1 station) over a 4-week period. Results obtained for the study indicated that with the exception of a single measurement of TSP which exceeded the USEPA 24-hour average of 150 µg/m³ in the Point Lisas central area, the levels of all the other reported parameters were within accepted international ambient standards.



3.1 Other Analyses of Air Pollution

There have been several pollutant inventory studies done to characterise air pollution sources and estimate loads. Some of these studies used simplified models (Rajkumar 1995, EMA/UNDP 1998, EMA 2000b) and one based on actual consumption data (EMA 2000b). Apart from these specific pollutant inventory studies, the EMA has been operating an investigation and complaints desk since 1995, and has compiled a wealth of data. The complaint data have been analysed and categorised, and the result illustrated in Figure 3.1. It is apparent from Figure 3.1 that the air complaints cover many sectors, however two main activities stand out, autobody repair and mechanics as well as woodworking.

Information from the inventory studies done for Trinidad and Tobago has categorised air pollution sources into either point or non-point source emitters. It has been previously pointed out that point sources refer to sources that release air pollution from a discernible point such as a stack from a factory. Non-point sources (also known as area sources) are those from which air pollutants are discharged in a diffused manner such as burning of agricultural fields or road side dust.

Figure 3.1. Analysis of air complaints made to the EMA between August 1995 and April 2000.

3.2 Air Pollutant Loads by Source

Figure 3.2 shows the individual air pollutant loads, using the most recent data available, which was extracted from the various reports mentioned in section 3.1. Based on an analysis of the data presented in Figure 3.2 with respect to TSP the major anthropogenic sources were from the manufacturing (milling 18%, urea 9% and cement 6%), quarrying (40%), transportation (road transport 10%) and agriculture sectors (6% burning of sugar cane fields). In the case of SO₂ the major sources were from the manufacturing (petroleum refining 19% and cement 7%), and transportation (road 63% and sea transport 9%) sectors. For NO_x the major sources were from the manufacturing (ammonia 5%), power generation (26%) and transportation (road transport 59%) sectors. For VOCs the major sources were from the manufacturing (petroleum refining 25% and ammonia 41%), and transportation (mainly road 21%) sectors. For CO the major sources were from manufacturing (58% petroleum refining), agriculture (9% burning of sugarcane fields) and transportation (mainly road 28%) sectors. Major sources of chlorine (Cl₂) and ammonia (NH₃) were from the manufacturing of these chemicals while particulate Pb was mainly from road transport (96%).

Based on the analysis of the greenhouse gases CO₂, CH₄, N₂O, NMVOC for year 1990 as presented in Figure 3.2 and in Figures 3.3 – 3.6 the main source of CO₂ was from the combustion of fossil fuel for energy production and transportation. These sources contributed 66% of the total anthropogenic or human-related carbon dioxide emissions, with industrial processes contributing the remaining 34% (Figures 3.4 – 3.6). With respect to non-CO₂ greenhouse gas (GHG) emissions the waste sector (i.e. solid waste disposal on land and wastewater handling) contributed the majority of the total load of CH₄.

3.2.1 Point Sources

The inventory reports have identified the following economic sectors as the main contributors for point source releases:

Manufacturing	related to the processing of raw materials, intermediate and final products from various commodities e.g. ammonia, methanol, chlorine, urea, paints, petroleum hydrocarbons, beer, glass, clay, asphalt, sand and gravel, lead-acid batteries, cement and lime, iron and steel and sugar, milling;
Electrical power generation	as a result from firing gaseous and liquid fuels;
Wholesale and retail trade of fuel	during storage, filling and refuelling; and
Transportation	fossil fuel combustion from all modes of transport.

Only 2 percent of the EMA's air pollution complaints and investigation database can be classified in the point source category. This included manufacturing (petroleum refining, sugar refining, iron and steel, asphalt batching plants), community, social and personal services (hospital incinerators, dry-cleaning laundries), wholesale and retail trade (restaurants, fuel tank filling). One such complaint was black smoke and noxious odours associated with an asphalt batching plant located in east Trinidad. Residents from the Mausica area complained vociferously about the impact that the facility's emission was having on their health which

including itching skin, rashes, headaches and dizziness. The EMA investigated the complaint and confirmed that heavy clouds of black smoke was emitted from the operation as a result of old equipment, lack of maintenance and no engineering controls. Three other asphalt plants were found to be in a similar condition.

3.2.2 Non-Point Sources

The main economic sectors responsible for non- point sources of air pollution as identified from the inventory reports and EMA’s complaints and investigation database include:

Two complaints in the category of non-point sources are worthy of mention. The first is

Mining and quarrying	and	from blasting, loading, unloading and crushing;
Construction		site preparation and complete construction
Agriculture		slash and burn, burning of agricultural fields, aerial crop spraying;
Community, social and personal services	and	malodours from sewage treatment plants, dumps, landfills, burning of landfills and dumps; and
Wholesale retail trade	and	automotive body repair and maintenance shops.

associated with noxious fumes and gases from an oil-producing field in south-western Trinidad, which left parents, teachers and children in the area with runny noses and eyes, vomiting, itching skin, rashes, headaches, and dizziness. An extensive investigation was conducted which led to the closure of the oil production facility and relocation of the school away from the source of pollution.

In the second case, residents, motorists and other users along the Beetham to the Audrey Jeffers Highway complained that smog, dust and objectionable odours from the burning of the Beetham Landfill resulted in runny noses and eyes, and sore throats. At the time of the incident the haze in the atmosphere was exacerbated by the presence of Sahara dust which further reduced visibility along the highway corridor.

This incident prompted a study to be carried out on the lung function of Beetham residents (Davis and Melville 1999) by UWI and the EMA with support from the community police. The results of testing of this small sample of residents (thirty-eight) showed that approximately fifty eight (58) percent showed some abnormality in lung function.

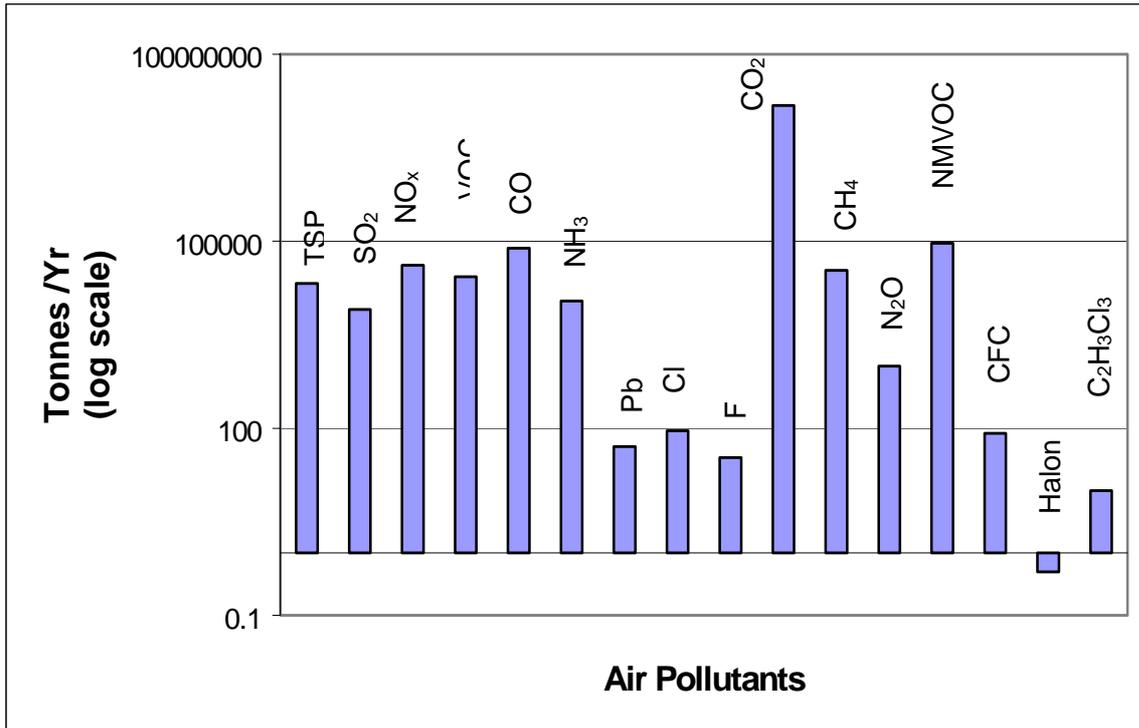


Figure 3.2. Individual air pollutant loads for Trinidad and Tobago.

For TSP, SO₂, NO_x, VOC, CO, NH₃, Pb, Cl₂ and F₂: data was extracted for the year 1996 (EMA/UNDP 1998). For CO₂, CH₄, N₂O, NMVOC: data was extracted for the year 1990 (EMA 2000b). For CFC, Halon and C₂H₃Cl₃: data was extracted for the year 1999 (EMA 2000b). Where data on individual air pollutants are presented it is an aggregate of both point and non-point sources.

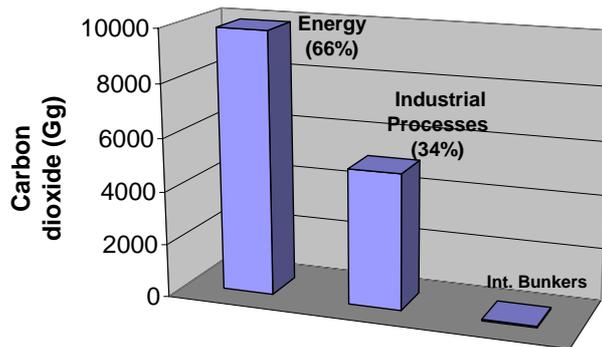


Figure 3.3:
Trinidad and

Carbon dioxide emissions in Tobago by sector in 1990.

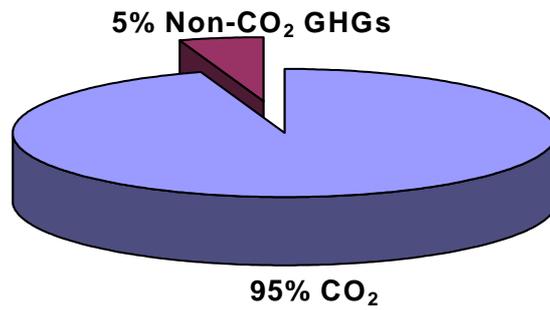


Figure 3.4. Greenhouse gas emissions in Trinidad and Tobago from the energy sector in 1990.

Total CO₂ from fuel combustion is 9,887 Gg. Non-CO₂ GHGs from fuel combustion total 520 Gg (CO₂ equivalents of CH₄ and N₂O were used).

Main releases for N₂O were generated from agricultural fields, while NMVOCs were from combustion of fossil fuel for energy production including transportation, as well as releases from industrial processes (Fig. 3.5).

It should be noted that the data summarised in the above Figures are given in carbon dioxide equivalent, meaning that since different greenhouse gases have different radiative abilities, the resulting warming effects of other gases have been converted to the warming effect of carbon dioxide.

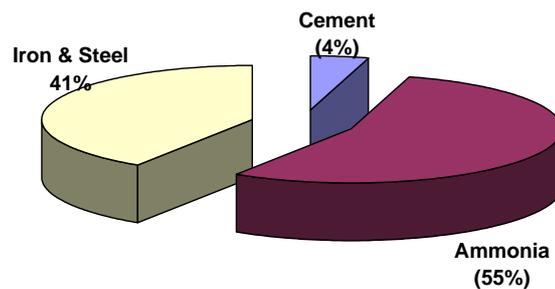
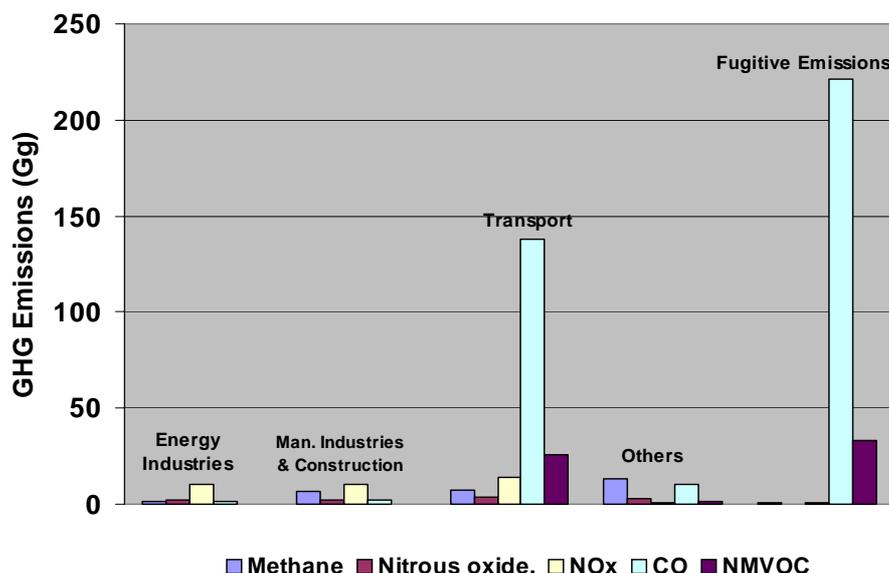


Figure 3.5. Non-CO₂ greenhouse gas emissions in Trinidad and Tobago for the energy sector in 1990. (CO₂ equivalents of CH₄ and N₂O were used).

Figure 3.6. Carbon dioxide emissions from relevant industrial processes in Trinidad and Tobago in 1990.



The total CO₂ emission for industrial processes is 5,100 Gg.

Trinidad and Tobago does not produce ozone-depleting substances (ODS) and imports all of its requirements. In 1999, the main CFCs consumed were from the servicing of air-conditioning and refrigeration systems (CFC-12) which represented 82% of total ODS consumed. Other CFCs (CFC-11, 113, 114 and 115) consumed but of lower importance are those used as propellants for aerosols, manufacture of rigid polyurethane foams, cleaning printed circuit boards and servicing biomedical equipment. Halons, the type used in fixed flooding fire protection systems, although having the highest ozone depletion potential, represent only 0.5% of the total ODS consumed. 1,1,1-Trichloroethane which represents approximately 11% of the total ODS consumed is used mainly as a metal cleaner, solvent and paint stripper. Consumption data on ODS compiled for the years 1986 – 1999 has shown a peak in 1989 followed by a general decrease.

Consumption data is a good guide in determining emissions of ODS. This is because discharged or leaked ODS in existing installations is replaced by new consumption. In new installations, without recycling, ODS will also be eventually released into the atmosphere, and need to be replaced by new consumption.

3.4 Important Sectors of Relevance to Air Pollution in Trinidad and Tobago

3.4.1 The Transport Sector

This sector has been singled out for particular analysis in light of the increasing negative impacts emissions and other pollutants from motorised vehicles have on land, air and water and on the quality of human life, agricultural crops and the wild flora and fauna of the country. Emissions from motor vehicles with spark-ignition engines (e.g. gasoline-fueled vehicles) are from the exhaust, engine crank case and fuel system. The major pollutants emitted from gasoline-fuelled motor vehicles are carbon monoxide, sulphur dioxide, hydrocarbons, oxides of nitrogen, and lead only if leaded fuel is used. For a given fuel quality, concentrations of many of these pollutants are influenced by such factors as: the air-fuel ratio in the cylinder at the time of combustion, ignition timing, combustion chamber geometry, engine parameters such as speed, load, and engine temperature, and the use of emission control devices.

The major pollutants emitted from diesel-fueled vehicles, emitted primarily in the exhaust emissions, are: particulate matter (including smoke), oxides of nitrogen, sulphur dioxide, carbon monoxide and hydrocarbons. For a given fuel quality, diesel engines tend to have low hydrocarbon and carbon monoxide emissions and considerably higher particulate matter emissions than gasoline-fueled vehicles. For heavy-duty vehicles, carbon monoxide and hydrocarbon and nitrogen oxides emissions in the exhaust also vary with driving modes, engine speed and load.

In 1998 a pilot programme to analyse emissions from motor vehicles and to enforce provisions of the Motor Vehicle and Road Traffic Act prohibiting emission of visible vapours from vehicles was jointly conducted by the Transport Division of the Ministry of Works and Transport and the EMA.

The programme tested vehicles on the road using portable equipment and at the Port of Spain Licencing Division using a fixed analyser. Although the report on the programme was unable to make generalisations on the emission levels of the Trinidad and Tobago fleet because of the small sample size, a significant proportion of the sampled vehicles failed United Kingdom standards for carbon monoxide and hydrocarbon emission levels. Moreover, many vehicles could not be tested because the level of smoke being emitted would have clogged the filtering system and fouled the equipment.

The greenhouse gas inventory of 1990 identified the transport sector as a significant contributor to greenhouse gas emissions. It accounted for about 15% of total carbon dioxide emissions in the energy sector; road transportation accounting for 1340 Gg of carbon dioxide out of a total of 1478 Gg for the transportation sector. Over the period 1990 – 1994, there was a 5.25% decline in the consumption of gasoline, with an 83% increase in diesel consumption over the same period, presumably as a result of the conversion to diesel engines by public transport vehicles such as taxis to cater for the cheaper diesel price.

It is noteworthy to mention the marked preference shown by the travelling public for individual private transportation and private commercial transport (taxis and maxi-taxis) relative to the use of available public systems such as buses. For example, customer levels for the public bus service decreased from 16.3 million in 1990 to 6.4 million passengers in 1998. As of April 2000, the number of registered vehicles in Trinidad and Tobago stood at 297,656 compared to 251,829 in 1998, an increase of over 45,000 in just over a year.

Interestingly, Latin America and the Caribbean is reported as having higher motorization levels* than other developing regions except Eastern Europe (Onursal and Gautam 1997). Further, from the data presented on motorization levels in 1990, for the countries in South America, Central America and the Caribbean region, Trinidad and Tobago had the highest motorization level (276 motor vehicles per 1000 people). With this trend, it can be expected that the transport sector will continue to be a significant source of air pollution for years to come.

3.4.2 Manufacturing Sector

Due in part to the different and varying processes involved in the manufacturing sector a wide range of air pollutants are expected to be emitted. Although the data presented above represents but a small fraction of the types of pollutants (TSP, NO_x, CO, VOC, Cl₂, Pb, NH₃, SO₂) that are likely to be emitted, continued industrial development and expansion without proper air pollution controls will see the introduction of other air pollutants into the atmosphere. Implementation of air emission control devices along with proper inspection and maintenance programmes are seen as the first line of defence in reducing the present level of emissions. Process changes and switching to cleaner production technologies would then be the ideal follow-up activities, further reducing air polluting emissions.

* Motorization is defined as the number of motor vehicles per thousand people.

3.4.3 Power Generation

The higher combustion temperatures involved in power generation favours the formation of oxides of nitrogen. This, coupled with the high volume released and its photochemical reactivity (precursor in the formation of ground level ozone), makes NO_x from power generation an environmentally important air pollutant. Electrical power generation in 1993 stood at 3.8 million MWH (or approximately 16,000 tonnes of NO_x released). With increased production capacity and the introduction of another power generation source, the power generation output now stands 5.5 million MWH, or an increase in NO_x by 1.4%. Continued economic growth and development, which normally translates into an increased demand for electricity, would indicate that NO_x emissions will continue to increase unless measures are instituted to conserve or reduce energy consumption. Switching to alternative forms of energy (e.g. solar, wind or wave) as well as increasing the use of energy saving appliances, machinery and lighting are some of the measures to reverse NO_x emissions from power generation.

3.4.4 Wholesale and Retail Trade

Apart from manufacturing sector evaporative emissions or losses from bulk fuel terminals (above ground tanks), the other major sources of VOCs are truck filling stations and service station operations. Like NO_x, VOC is an important precursor in the formation of ground level ozone. The current dependence on gasoline, diesel, jet naptha and crude oil and the prediction that this would remain so for some time, demands that some modifications to the core business be instituted. Changes in the way bulk fuel is stored, and loaded into tanks are needed. For example, storage could be changed from fixed roof tanks to floating roof tanks, and loading techniques changed from splash loading to submerged loading, along with the introduction of vapour recovery systems at service stations. These changes would ensure that this sector becomes a minor contributor to VOC releases in the future.

4.0 STATUS OF INSTITUTIONAL ADMINISTRATION AND LEGISLATIVE CONTROLS AND POLICY SPECIFIC TO AIR POLLUTION

4.0 Air Pollution from Stationary Sources

Presently there is no legislation that refers specifically to the direct control of air pollutants emitted by stationary anthropogenic sources. Existing legislation addresses non-specific air pollutants. For instance, smoke, odours and fumes constitute an actionable nuisance when they interfere with the use and enjoyment of property. The Public Health Ordinance (1950), section 69 imposes a duty on the part of local authorities to initiate action to abate nuisances. The enforcement agencies for this legislation are: the Municipal Corporations and the Ministry of Health. Provision for the control of air pollution as a nuisance also exists under the Municipal Corporations Act (1990), with penalties of \$500.

The Petroleum Act (rev. 1980) contains provision for the prevention of air pollution, with the enforcing agency as the Ministry of Energy and Energy Industries. The Ministry also has responsibility for enforcement of provisions for the prevention of uncontrolled flow of gas in accordance with the Drilling Regulations made pursuant to the Mines, Borings and Quarries Act (rev. 1980).

4.1 Air Pollution from Mobile Sources

Rule 13 of Regulation 38 made under the Motor Vehicles and Road Traffic Act, Chapter 48:50 section 100, states that every driver of a motor vehicle:

"shall not permit sparks, smoke or visible vapour of any avoidable nature which would cause annoyance or danger to the public to come from any motor vehicle in his charge on or near any public road..."

(Visible Vapour Rule)

Accordingly, Transport Officers and Police Officers may serve fixed penalty notices (tickets) charging the driver with the commission of an offence and requiring the driver to pay a fixed penalty within fourteen (14) days or to appear in court to answer a complaint. On summary conviction in court, the penalty for a breach of the Act or Regulations is a fine not exceeding \$1000.00 or imprisonment for up to six months.

Also, section 100 of the Motor Vehicles and Road Traffic Act (1997) adds authority for the Minister to make regulations for :

(q) health, safety or environmental matters...including the prescribed vehicle emissions, use of unleaded fuels..."

Provision is also made under the Motor Vehicles and Road Traffic (Amendment) Act, No. 25 of 1997, section 14 for the de-registration of a vehicle for causing an environmental hazard. The enforcement agency is the Licensing Authority, and the penalty is cancellation of licence.

Table 4.1. Laws relating to Air Pollution in Trinidad and Tobago

Law	Enforcement Agency	Penalty
Motor Vehicles and Road Traffic Regulations, made pursuant to the Motor Vehicles and Road Traffic Act (rev. 1980), Regulation 38, Rule 13 – visible emissions	Licensing Authority, Police Service	\$60.00
Motor Vehicles and Road Traffic (Amendment) Act, No. 25 of 1997, Section 14 – deregistration for causing an environmental hazard.	Licensing Authority	Cancellation of License
Section 44, Customs Act, Ch. 78:01 (rev. 1980), “ The President...may prohibit importation of any goods whatsoever..”	Customs and Excise Division	--
Petroleum Act (rev. 1980), Section 29 (l) (j) – Prevention of air pollution	Ministry of Energy and Energy Industries	--
Public Health Ordinance (1950), Sections 69 and 70 – Nuisance Public Health Ordinance (1950), Section 70 (1) (m) –prohibits black smoke from chimneys	Municipal Corporations; Ministry of Health	\$500.00

Table 4.1 Continued. Laws relating to Air Pollution in Trinidad and Tobago

Law	Enforcement Agency	Penalty
Municipal Corporations Act (1990), Section 221 (I) – Nuisance	Municipal Corporations	\$500.00
Standards Act No. 18 of 1997, Section 15 (I) – Power to make environmental standards	T&T Bureau of Standards	\$15,000.00
Consumer Protection and Safety Act (1985), Section 21 (I)- Conduct detrimental to the health of consumers	Ministry of Consumer Affairs	\$10,000.00
Environmental Management Act (2000) Sections 49-51- Authorises the EMA to develop a legal regime for management of air pollution	EMA	\$100,000.00
Gas Cylinders (Use, Conveyance and Storage) Act (rev. 1980), Section 2 – Control of gas cylinders.	Ministry of Energy & Energy Industries	\$750.00
Drilling Regulations made pursuant to the Mines, Borings and Quarries Act (rev. 1980), Regulation 18 (I) – Prevention of uncontrolled flow of gas.	Ministry of Energy & Energy Industries	\$1,000.00 plus costs
Section 4 (2) of the Trade Ordinance No. 19 of 1958- Prohibiting importation of environmentally harmful products.	Ministry of Trade	—
Legal Notice No. 69 of 1999- places certain prohibitions on the import of Ozone Depleting Substances and equipment using ODSs pursuant to the Trade Ordinance 19 of 1958		—

4.2 State of Enforcement of Existing Law related to Air Pollution Control

With respect to enforcement of laws related to air pollution from stationary anthropogenic sources, available data indicate that for the years 1997 and 1998, there were no enforcement proceedings under the Public Health Ordinance for control of emissions of black smoke and similar nuisances.

With respect to enforcement of the “Visible Vapour Rule” which controls air pollution from mobile sources, available data indicate that for the years 1997 and 1998, there were 38 and 214 enforcement proceedings respectively. In 1999, there were 1,199 such enforcement proceedings. This is largely attributable to the EMA’s pilot project of a squad of “Special Reserve Police” serving as “Environmental Police Officers”, enforcing specific laws with provision for environmental protection, including the Motor Vehicles and Road Traffic Act.

In general, the factors influencing non-enforcement of environmental laws include:

- (a) failure to use regulatory power, such as to create bylaws, rules etc.;
- (b) antiquated and outdated regulations;
- (c) vagueness or absence of specific standards in the law;
- (d) inadequate resources, especially financial resources;
- (e) lack of punitive sanctions.

4.3 Environmental Management Act, 2000

The general functions of the EMA include: the development and establishment of national environmental standards and criteria; monitoring compliance with the standards, criteria and programmes relating to the environment; pollution prevention and control, and conservation of the environment; and co-ordination of institutional linkages, locally, regionally and internationally.

Overall, the EMA is required to develop and implement a programme for the management of air pollution. Section 49 (1) of the Act mandates the Authority to investigate the environment generally and such premises and vehicles for the purpose of:

- (a) ascertaining the extent of air pollution and the significant sources of pollutants which by their release cause or contribute to such pollution; and
- (b) characterising or describing the environment.

The Authority is also required to maintain a register of air pollutants (in accordance with prescribed rules) which shall contain data identifying the quantity, conditions or concentrations relevant to the identification of each pollutant. Registration of significant sources of air pollutants is also required.

The Act also allows the Authority to require and grant permits to authorise any process releasing air pollutants subject to such terms and conditions as it deems appropriate. Permit conditions may relate to the design, construction, operation, maintenance and monitoring of the facility and processes releasing the air pollutants. The Act also prohibits the release of any air pollutant into the environment which is in violation of any applicable standards, conditions or permit requirements.

4.4 Policy Objectives for the Air Pollution Control Strategies

The National Environmental Policy of Trinidad and Tobago articulates the goal of the policy as:

“ the conservation and wise use of the environment of Trinidad and Tobago to provide adequately for meeting the needs of present and future generations and enhancing the quality of life ”.

Government’s approach to attaining this goal is to pursue a strategy of sustainable development, meaning improving the quality of human life while living within the carrying capacity of supporting ecosystems.

Further, the specific objectives of the Policy are to:

- (a) prevent, reduce or eliminate various forms of pollution to ensure adequate protection of the environment and consequently the health and well-being of humans;
- (b) conserve the biological diversity of the country and the stability and resilience of the ecosystems;
- (c) undertake retrospective analyses or evaluations to correct past development decisions that might be inimical to the continued environmental health of the country.

These objectives emphasise pollution prevention, conservation and environmental remediation.

With respect to pollution control, the Policy is clear that Government will promote a co-operative environmental management approach with industry and interested stakeholders to promote consensus and partnership in achieving environmental targets. In addition, Government will operate an integrated environmental management system that will cover all major solid, liquid and gaseous emissions to air, land and water. Pollution control will be enforced through a system of permits or licence that will set pollution limits or performance standards. Compliance with codes of good practice may be required of “less polluting” facilities.

The Policy also states several approaches that will be utilised in controlling air pollution. These include: the establishment of ambient air quality standards as well as emission limits for stationary industrial plants, reductions in production and use of polluting products, and substance-oriented approach for integrated pollution control of that substance.

It is in the context of these policy objectives that the following national strategies and programmes have been formulated for the control of air pollution in Trinidad and Tobago.

5.0 STRATEGIES FOR AIR POLLUTION CONTROL

5.0 The strategies described in this section are separated into those that are general in application and are targeted towards overall management and control of air pollution and those that are focused on a particular sector source.

5.1 General Application

These strategies address primarily ambient air quality management and overall performance of the air pollution control programmes.

5.1.1 National Ambient Air Quality Standards

National ambient air quality standards and criteria for Trinidad and Tobago are being established. These will serve as the air quality objectives (targets) for the setting of limits for pollutants (or substances containing pollutants) that may be released into the ambient air by various sources, whether new or existing, industrial or transport sector-based, point or non-point in origin.

The national ambient air quality standards will provide a basis for protecting public health from the adverse effects of air pollution, and for eliminating, or reducing to a minimum, those air pollutants that are known to be or are likely to be, hazardous to human health and well-being and the environment.

These standards have been largely based on the guidelines for criteria pollutants, established by the WHO in "Guidelines for Air Quality" (WHO 1999).

These standards specify maximum levels over specified averaging times, for the criteria pollutants (total suspended particulates, PM₁₀, carbon monoxide, sulphur dioxide, oxides of nitrogen, lead and ozone). Ambient air quality guideline values for other air pollutants (non-criteria) based on non-carcinogenic and on carcinogenic health endpoints will also be established.

5.1.2 National Ambient Air Quality Monitoring System

A national ambient air quality monitoring system will be developed and implemented. Its primary purpose is to ascertain the following: the quality of the ambient air in various key locations in Trinidad and Tobago, the extent of air pollution, the significant sources of pollutants, which pollutants contribute to the pollution and the characterisation or description of air pollution.

Ambient air monitoring fulfils a central role in national air quality management, as it provides the necessary sound scientific basis for the following: policy and strategy development, objective setting, measurement of compliance against set targets and enforcement action.

The ambient air monitoring network should be designed with the following key objectives in mind:

- (a) informing the public about air quality and raising awareness;
- (b) determining population exposure and health impact assessment;
- (c) identifying threats to natural ecosystems;
- (d) assessing point or area source impacts;
- (e) determining compliance with established Ambient Air Quality Standards.

The limitations of monitoring should also be noted, for example in determining population exposure, and hence it should be used in conjunction with other objective assessment techniques.

5.1.3 Other Means of Ambient Air Quality Assessment

Because of the inherent limitations of ambient air quality monitoring, other means for ascertaining the quality of ambient air should be devised to supplement the data obtained through monitoring. In this regard, other objective assessment techniques and models (such as air dispersion models, source emission inventories) should be defined and standardised for use in Trinidad and Tobago.

5.1.4 Air Quality Indices and Other Performance Indicators

Air quality indices to provide an indication of the quality of the ambient air in certain population centres should be established. Other performance indicators should be established to measure and assess not only the quality of the ambient air, but also the overall effectiveness of the strategies and programmes for air pollution control.

5.1.5 Health Studies

Health studies to determine the effects of specific sources of pollution on various segments of the population need to be designed and conducted. The information obtained through these studies will be critical in identifying priority areas and in developing future air quality management strategies.

5.1.6 Official Linkages with Relevant Agencies

For the effective implementation of proposed air pollution controls and co-ordination of enforcement of existing legislation, linkages must be established with the following agencies:

- (a) Fire Services Department for control of open burning;
- (b) Ministry of Food Production and Marine Resources and the Forestry Division, Ministry of the Environment for controlled agricultural burning, as well as for control of forest and bush burning, and for promotion of environmentally sound agro-industrial practices;
- (c) Town and Country Planning Division with respect to ensuring land use and physical development consistent with planning approvals granted;
- (d) Ministry of Health, and other relevant Ministries and agencies, and municipal and regional corporations for enforcement of existing laws with air pollution control provisions;
- (e) Non-Governmental Organisations (NGOs) and Community Based Organisations (CBOs) for dissemination of information and implementation of community-based air pollution control programmes;
- (f) Trade and industry associations for development of industry "codes of good environmental practice" and promotion of their use.

5.1.7 Special Programme for Control of Hazardous Air Pollutants, including Persistent Organic Pollutants (POPs)

Because of the risk (proven and potential) posed to human health and the environment, as well as the nature of some hazardous air pollutants, in terms of being persistent in the environment and bio-accumulative, it is essential that programmes are designed and implemented to reduce and eliminate these substances from being released into the environment, and eventually from use. These substances include dioxins and furans.

Consideration must also be given to contingency measures in cases of emergencies that may result in the release of these substances in high quantities into the environment.

5.1.8 Public Awareness Programmes

Educating the public on the sources of air pollution, the various air pollutants, their adverse health and environmental effects and the actions that can be taken to reduce and eliminate such pollution is essential in securing public support for the EMA's initiatives in this area.

5.2 Strategies for Control of Air Pollution from Stationary Sources

5.2.1 Registration And Characterisation of Industrial Sources of Air Pollution

As part of the strategy for air pollution control from industrial sources, facilities/sources (significant) must be registered and their contribution to air pollution assessed. Facilities/sources shall be characterised based on the following factors:

- (a) type of industry;
- (b) type of air pollutants emitted;
- (c) whether facility includes point source emissions, non-point (area) source emissions;
- (d) quantity of air pollutants emitted.

The characterisation and subsequent classification of sources of air pollution are critical, as this impacts on the development of emission inventories. (See section 5.1.3)

Legal rules shall be established for the procedure for the registration of these sources from which pollutants may be released into the environment, and for the procedure for the characterisation of such sources.

5.2.2 Limits for Emissions of Air Pollutants from Stacks and Fugitive Sources

National emission standards shall be established. These national standards will specify the quantity, condition or concentration of pollutants or substances containing pollutants that may be released into the environment generally, or by specific sources or categories of sources.

With respect to emissions from major point sources, stack emission standards shall be established. With respect to fugitive and other non-point sources of air pollution, the national ambient air quality standards will be applied to assess the quality of the ambient air. Non-compliance with these standards will serve as a trigger for abatement action by potential source(s) of the air pollution.

These emission limitation standards will be incorporated into legal rules established under the Environmental Management Act, 2000.

The development of the standards was guided by the following principles – that the standards should be feasible, practical and effective, bearing in mind technological, legal, economical, and social factors, and be enforceable, flexible and evolutionary in nature.

5.2.3 Measures to Encourage Compliance with Standards

Strategies must be implemented to “encourage” compliance with prescribed Stack Emission Standards and Ambient Air Quality Standards. The following approaches recommended by WHO (1999) offer various benefits towards industry compliance with emission controls:

- (a) command and control
- (b) economic instruments
- (c) co-regulation
- (d) self-regulation.

5.2.3.1 “Command and Control” Measures

As stated in the National Environmental Policy, Government's approach to environmental management is predicated on the "command and control" approach, in which pollution control will be enforced through a system of permits or licences which will set pollution limits or performance standards for air, water, waste and hazardous substances. Permits may include environmental monitoring and reporting requirements. (Businesses with impacts too insignificant to justify regular monitoring may simply be required to follow codes of good procedure.)

Hence, the "command and control" measure will form a major part of the strategy for control of air pollution from industrial sources. In accordance with the Environmental Management Act (2000), industry will be required to comply with the established standards for air pollution control and with procedures and other requirements with respect to relevant air pollution permits or licences. These will constitute "environmental requirements" and compliance with the specified requirements will be checked by government inspectors.

In addition, new developments or major changes to existing sources that may significantly impact the environment (including emissions of air pollution), will be required to obtain a Certificate of Environmental Clearance, and for certain designated activities, an Environmental Impact Assessment (EIA) may be required to be performed.

The "command and control" approach is well suited for application in Trinidad and Tobago as the process of "commanding" i.e. specifying the requirements for emission limits, permits and monitoring, is transparent and provides a degree of certainty to industry. Also, the "control" aspect is based on the "polluter pays" principle and instils public confidence in the system.

The "command and control" system also poses several drawbacks. It is considered to be time-consuming to implement, expensive, rigid and legalistic. These systems often focus on end-of-pipe solutions instead of more comprehensive pollution prevention approaches. While it may establish a minimum condition, the system, by itself, provides no incentive to minimise emissions.

Many of these shortcomings of the traditional "command and control" approach will be overcome in the overall programme for management of air pollution control rules. In any event the experience of other countries suggests that "command and control" measures are complementary to and a necessary prerequisite for more evolved compliance programmes.

5.2.3.2 Economic Instruments

Section 34 of the Environmental Management Act, 2000 empowers the Environmental Management Authority to develop, promote and implement appropriate incentive programmes which encourage the voluntary use of effective environmental management systems and the achievement of improvements in environmental quality. Further, with the approval of the Minister, the Authority may impose pollution charges or user fees to encourage the protection and conservation of the environment.

As part of its national strategy, the EMA should investigate the use of these instruments in controlling air emissions in Trinidad and Tobago. Important factors to be considered in determining the feasibility and type of economic instruments to be used include:

- (a) the sources of air pollution, and their respective location, size and quantity of emissions, and associated risk to human health and the environment;
- (b) the longevity of the particular sources;
- (c) the state of development of the local economic market;

- (d) the mechanism and resources required to administer such a system of economic incentives.

Reversing the current prices of leaded and unleaded gasoline is an example of an effective economic incentive strategy that will immediately produce the desired results of significantly phasing out the use of leaded gasoline.

5.2.3.3 Co-regulation

As mentioned in Chapter 4, Government's policy emphasises the promotion of a co-operative environmental management approach between Government, industry and interested stakeholders.

In the "co-regulation" approach, Government prescribes environmental rules and guidelines, while compliance with the legal requirements is conducted in a collaborative manner by industry and the Government. The rules specify the air pollutants to be monitored (stack as well as ambient), the sampling protocols, monitoring requirements, record-keeping and reporting requirements. The responsibility lies with the industrial facility to conduct the required monitoring of emissions and air quality, and to report accordingly to the regulatory authority. The Authority will then develop national registers of air emissions inventories.

As part of its National Strategy for Air Pollution Control, the EMA will develop a system of co-regulation for emissions control. Because of the resources required (skills, finance, etc.), the system of co-regulation is especially well suited for application to large industrial facilities (treated individually or as an industry group), that are significant sources of air pollution. The benefits offered by such an approach include cost effectiveness and partnership with industry.

5.2.3.4 Self-regulation

In the self-regulation approach to emission control, industry groups impose their own environmental guidelines and system of environmental audits to monitor compliance.

The EMA plans to promote the use of the self-regulation approach by industries, in developing Environmental Management Systems (such as the ISO 14000 type), which specify requirements that go beyond compliance with environmental laws. In this way, the EMA will be encouraging overall company-wide environmental management.

5.2.4 Strategies for Control of Air Pollution from the "Small And Micro" Sector

5.2.4.1 General

Analysis of the EMA's database of complaints revealed that 98 percent was about small- and micro- businesses engaged in activities such as light manufacturing and material processing, commercial trading, food processing, and various trades such as automotive body repair and mechanics, wood working. This sector is contrasted with large, heavy industries, such as the petrochemical plants at the Point Lisas Industrial Estate.

In general terms, these small and micro businesses possess the following characteristics:

- (a) they are small scale operations, usually owner operated and controlled, and are not classified as "foreign exchange earners";
- (b) owners and employees live in the vicinity of the place of business;

- (c) the business place is not located in an industrial estate or commercial district, is located in close proximity to residences and is usually serviced by general municipal garbage collection and disposal services;
- (d) the business usually has an informal organisation, in terms of staff responsibilities, education and training requirements, etc.
- (e) some of the businesses engaged in skilled trade activity serve as an initial training/working place for young tradespeople (mechanics, automotive body straighteners, woodworkers, etc.).

In light of the potential environmental pollution that can be presented by this sector, as well as the inherent characteristics, strategies with the following attributes have been devised to control air pollution from this sector:

- (i) the strategy must be effective in controlling environmental pollution as a whole, with emphasis on source reduction, at a reasonable cost;
- (ii) the pollution control strategy must be practical to implement from the perspective of the business owner, and be practical to enforce from the perspective of the regulatory authority. Enforcement must be based on simple and objective criteria and amenable to rapid response, using available human resources.

5.2.4.2 Rules for the Control of Pollution from Specific Industries

In accordance with section 26 (l) of the Environmental Management Act, 2000, the EMA plans to develop rules for the design, construction, operation, maintenance and monitoring of facilities or processes for the control of pollution and the handling of wastes. Based on the analysis of the EMA's complaints database, the following industries are of high priority: automotive body repair and mechanics, woodworking, service stations, food preparation establishments, use of paints, solvents and other chemicals.

These Rules should specify effective plant layout, processes, equipment and technology for the control of pollution into all media, and make compliance legally mandatory.

The primary benefit of this approach over the establishment of specific standards for pollutant levels is the focus on the cause of the environmental problem, rather than on the pollutant levels. This approach also offers ease of enforcement, the facility for a rapid response to environmental complaints, and keeps the attention of the business owner/operator on environmental performance through mandatory periodic maintenance of equipment.

5.2.4.3 Codes of Good Environmental Practice

The Rules mentioned above could be expanded into "Codes of Good Environmental Practice" for specific industrial activities. These codes will be more extensive than the Rules, and specify, among other requirements, procedures, processes, equipment and technology (process as well as pollution control) that will be effective in controlling environmental pollution at a reasonable cost. These codes should be based on an integrated approach (multimedia management) to pollution prevention, and be amenable to independent auditing.

The codes will define the objective criteria for assessing good environmental practice by the respective industry, and can be utilised for second-party and third-party auditing.

5.2.4.4 Incentive Programmes to Encourage Environmental Probity

Appropriate incentive programmes to encourage voluntary compliance with good environmental practice should be developed, promoted and implemented. One such programme may focus on

compliance with the “Codes of Good Environmental Practice”. Another programme may focus on overall environmental management, and for this, environmental management systems such as the ISO 14000 type would serve as the objective criteria.

The incentive programmes may include: environmental certification by the EMA or TTBS, and national recognition through environmental awards.

5.2.4.5 Technical Education and Training

Pollution control in the industrial activities conducted by small and micro businesses in this sector can be readily effected through technological and other means. In this regard, the EMA should work closely with all technical training institutions to have incorporated into the respective curricula, programmes on the health and environmental effects of the industrial activity and the technological and other means for minimising such effects.

5.2.4.6 Public Awareness Programmes

Awareness programmes to educate the public on the adverse health and environmental effects posed by various industrial activities, and the action that can be legally taken to abate such activities, should be designed and implemented. These programmes should be disseminated through the mass media as well as through community and trade association meetings.

For maximum benefit, these public awareness programmes should be developed and implemented in conjunction with other critical groups such as: community groups, municipal and regional corporations, religious organisations, Ministry of Education and other relevant Ministries.

Communities will serve as an invaluable ally in encouraging compliance with good environmental practice and hence curbing environmental pollution.

5.2.4.7 Provision of Garbage and Other Waste Disposal Facilities

Primarily because of convenience and cost, many small businesses prefer to openly burn their garbage. As part of the overall national management plan for solid and hazardous waste, facilities should be provided for the garbage and other waste disposal facilities.

5.2.4.8 Siting and Location

Existing legal requirements controlling physical land use should be enforced to ensure that business places that may contribute to air pollution are not located in residential areas, in contravention of the law.

5.2.4.9 Research

The EMA should work with the University of the West Indies, to effect research into appropriate, effective and low-cost air pollution prevention and abatement measures (including plant layout) for small and micro businesses engaged in activities such as: automotive body repair and mechanics, woodworking, and food preparation.

5.2.4.10 Influence Key Relevant Institutional Decision-makers

The EMA should work with key institutional decision-makers in both the private and public sector, to emphasise the importance of good environmental performance among their clients. In particular, dialogue should be held to influence decision-makers of organisations such as financial institutions and insurance companies, to include demonstration of sound environmental performance in their approval criteria for granting financing in the case of financial institutions, or for listing as an approved repair garage in the case of automobile insurance companies. This performance may be evidenced by no significant adverse environmental effects, or, by use of clean technologies.

5.3 Strategies for Control of Air Pollution from Mobile Sources (The Transport Sector)

5.3.1 Vehicle Targeted Measures

As mentioned in Chapter 3, the transportation sector is the most significant source of GHGs. Many of the following strategies will therefore not only minimise and control emissions of criteria pollutants and toxics but also reduce the generation of GHGs.

5.3.1.1 Exhaust Emission Standards for Vehicles

Standards that are legally enforceable are being established by the TTBS for the exhaust emissions of the various classes of motor vehicles in Trinidad and Tobago, such as light motor vehicles and heavy motor vehicles. These standards will establish maximum permissible limits for key parameters of the exhaust of motor vehicles according to the fuel type of the vehicle engine (i.e. gasoline, diesel, compressed natural gas (CNG), other fuel). For gasoline engines and CNG engines, these key parameters should include: carbon monoxide, hydrocarbon, while for diesel engines, the key parameters should include opacity of the exhaust emissions.

The standards established should be effective in controlling air pollution from motor vehicles thus reducing the risk to human health and the environment, while at the same time they should be practical, technically and economically feasible and enforceable.

It is envisaged that the Standards when completed will be incorporated in Regulations under the Motor Vehicles and Road Traffic Act, Chapter 48:50. This legislation will specify appropriate penalties for non-compliance with the specified limits.

5.3.1.2 Inspection of New Vehicles

All new motor vehicles are required to be inspected at the Licensing Office, before registration. The current inspection checklist should be expanded to include checks of the exhaust emissions (using gas analysers) against the numerical limits for key parameters contained in the National Standard on Exhaust Emissions from Motor Vehicles. This programme of inspection before registration will set the foundation for ensuring that all new vehicles comply at the outset with the established exhaust emission standards.

Vehicles whose exhaust emissions do not comply should not be registered until the necessary corrective action has been taken, the exhaust emissions re-analysed and found to be in compliance.

5.3.1.3 “Inspection And Maintenance System” for In-use Motor Vehicles Over a Specified Age

Under the “Testing of Private Vehicles” amendment to Regulations under the Motor Vehicles and Road Traffic Act Chapter 48:50, all private motor vehicles that are five or more years old, are required to be inspected at approved “vehicle testing stations”. This inspection currently examines all the automotive systems, including the following, which are related to the exhaust emissions: engine checks, and undercarriage checks of the exhaust system (noise, corrosion, length).

When the Exhaust Emission Standards are incorporated into law, the inspection of in-use vehicles should be expanded to include inspection of the exhaust emissions using exhaust gas analysers. Only vehicles that comply with the standards should be allowed for use in the country.

5.3.1.4 System of Road Checks on Vehicles

As stated in section 4.1, smoke and visible vapour emitted from motor vehicles are controlled under the “Visible Vapour Rule”. This can be enforced through road checks, and stopping vehicles that appear to emit excessive amounts of smoke and other visible vapour, as visually

determined by the enforcing officer. These road checks should focus on grossly polluting vehicles.

The system should be further developed to de-register vehicles if they are found in non-compliance with the "Visible Vapour Rule" and the relevant exhaust emission standards on more than a specified number of occasions within a specified time frame.

When a driver has been charged with an offence under the "Visible Vapour Rule", the enforcement officers should consult the Transport Commissioner so that a "call-in" notice can be despatched. The vehicle can then be tested again, and if the exhaust emissions are not in compliance with the National Standards, the vehicle's registration may then be suspended or even cancelled.

Vehicle road checks of this nature are easily enforceable and supplement the "Inspection and Maintenance Programmes" described in section 5.3.1.3. Also, because the time and place of these inspections cannot be predicted, they are difficult to defeat through tampering of vehicle components that affect exhaust emissions, or temporary installation of such components during planned inspection and maintenance visits. Nevertheless, in the scheduling of the road checks, the inconvenience posed to drivers and other users of the roads during these occasions should be borne in mind by the enforcement officers.

5.3.1.5 Differential Vehicle Taxes, Registration Fees and Other Fees

The vehicle registration fee or taxing scheme can be designed so that it influences prospective purchasers of new vehicles to buy fuel-efficient and low-polluting vehicles, rather than energy-inefficient vehicles that are in bare compliance with the emission standards. This goal can be achieved by the development of a system of differential vehicle taxation rates, and registration or other fees; i.e. the registration (or other) fee or tax on the vehicle varies according to how low its exhaust emissions are compared with the Exhaust Emission Standards. This system may bring the most environmental benefits when applied to diesel-fuelled, heavy vehicles.

The differential vehicle taxation rates and registration fees scheme can be part of a vehicle replacement programme aimed at taking old, polluting vehicles out of circulation.

The fees and taxes structure should encourage owners to replace their old (15 years and older) polluting vehicles; for example, by providing an increasing margin of rebate off the tax or fees for a new vehicle based on the age of the (old) vehicle being "retired". Other incentives to encourage voluntary replacement or scrapping of vehicles should be investigated.

5.3.1.6 Vehicle retrofit programmes

Data from the Licensing Office indicates that approximately 60 percent of the total registered vehicular fleet in Trinidad and Tobago is over 10 years of age. Many of these vehicles were not manufactured with emission controls. Retrofit programmes should be investigated to bring in-use vehicles manufactured without emission controls in compliance with emission standards.

Retrofitting programmes are generally targeted at polluting, high-use vehicles such as diesel-fuelled, heavy commercial-use vehicles. Retrofitting may take different forms including engine work, installing pollution control components, or changing fuel systems to burn cleaner fuels, for example, converting to compressed natural gas.

The feasibility of implementing vehicle retrofit programmes in the country, targeted at heavy-use commercial vehicles, should be investigated. Consideration should also be given to the use of appropriate incentives to encourage voluntary retrofitting.

5.3.2 Fuel Targeted Measures

5.3.2.1 Legally Enforceable National Standards for Fuel

The Trinidad and Tobago Bureau of Standards has established national standards prescribing requirements for the quality of unleaded gasoline, leaded gasoline and automotive diesel fuel. (These standards have compulsory status under the Standards Act). These standards were developed after consideration of not only performance characteristics, but also environmental concerns.

All automotive fuel sold to the public in Trinidad and Tobago is produced by the Petroleum Company of Trinidad and Tobago Ltd. (Petrotrin) and distributed by the National Petroleum Marketing Company Ltd.

The EMA has received numerous claims by motorists, charged under the Visible Vapour Rule, that the quality of the diesel fuel is the cause of the violation. The above-mentioned National Standards will serve as the basis for assessing the quality of the fuel, and in this regard, the EMA should co-ordinate with the relevant regulatory and testing agencies on the implementation of a programme to continuously monitor the quality of diesel fuel supplied for local use. The monitoring programme can include random sampling and inspection, as well as the maintenance of appropriate quality assurance reports relating to batches of fuel sold.

5.3.2.2 Phase-out of Lead in Gasoline

The major source of lead in ambient air is the lead used in leaded gasoline for use in spark ignition combustion engines. Available data indicate that more leaded gasoline than unleaded gasoline is sold in Trinidad and Tobago.

Hence, the single most effective programme for the reduction of lead in ambient air is the phase-out of lead in gasoline, conducted within a broader integrated air pollution management plan.

Under the project of the UNDP/World Bank Energy Sector Management Assistance Programme (ESMAP) for the "Elimination of Lead in Gasoline in Latin America and the Caribbean", Trinidad and Tobago is reported to be committed to the phase-out of lead in gasoline by the year 2002.

5.3.2.3 Promotion of the Use of Cleaner Fuels

Programmes should be implemented to voluntarily encourage the use of cleaner fuels such as unleaded gasoline, and compressed natural gas.

Natural gas, which contains predominantly methane (95 to 99 percent) with the balance made up by other gases such as ethane and propane, is recognised as one of the cleaner combusting fuels and hence an attractive fuel for motor vehicles in terms of non-polluting exhaust emissions. However, many practical difficulties have been advanced against the use of this fuel such as: location and number of CNG re-fuelling stations, time taken to re-fuel, low power of CNG fuelled vehicles. A study to quantify in terms of pollution reduction and energy consumption should be conducted to justify Government's investment in the provision of facilities to alleviate these factors.

The EMA should work with other key players in the introduction of cleaner alternative fuels in Trinidad and Tobago.

5.3.3 Transport Management Measures

Increased ownership of private vehicles as well as increased industrialisation and construction which increase the demand for public transport vehicles and heavy vehicles, all contribute to increased traffic congestion. The slow movement of motor vehicles on congested roads results in higher fuel consumption and increased rates of pollutant emissions. Traffic congestion also burdens productivity because of the cost of time lost during travel.

The feasibility of implementing various transport management measures in urban centres and along major roadways should be considered. Also, local factors such as the physical infrastructure in the area, characteristics of the transport system, layout of the urban area, and the transport demand and causes for it (such as presence of trade and business places) should be included in the study.

The following are potentially feasible transport management measures that the EMA plans to explore, for implementation with the relevant agencies.

5.3.3.1 Restrictions on On-street Parking and Street Trading

Traffic flows in heavily congested streets can be improved by imposing on-street parking restrictions, which can be implemented at all times, during the day-time, or only at peak hours. These restrictions require installation of signs and a firm enforcement effort through fining, wheel clamping, and towing. Restrictions of parking on streets should also be considered to ease traffic congestion

Street trading on crowded streets adversely affects traffic flow, and hence controls should be introduced to limit street trading. Like all transport management measures, due consideration needs to be taken of the particular nature of the locality where the measure is to be implemented.

5.3.3.2 Improvement of Road Infrastructure and Network

Poor physical condition of roads requires vehicles to slow down and this can contribute significantly to congestion during certain times of day. An expanded road network will provide alternative routes to various key locations, again contributing to reduced traffic congestion. Traffic flow can be improved through such modifications to existing infrastructure as widening of roads to provide turning lanes, construction of short road links at critical locations and building footbridges and walk-overs for pedestrians.

5.3.3.3 Land Use Planning and Controls; Facilities Planning

Land use planning is a critical strategy in controlling transport-related air pollution, through the establishment of patterns for land development and specific areas for residential, educational, commercial, industrial, and recreational facilities. Planning of this nature controls future population densities in these areas that affect the demand for transport services and hence the associated air pollution. By bringing schools, offices, shops, and recreational facilities closer to residential areas, the amount of travel for work and other activities is reduced.

The location of business places including government offices out of city centres is another option that can be considered in attempting to alleviate traffic congestion and hence vehicular air pollution.

5.3.3.4 Improvement of public transport services

Since congestion-induced air pollution in urban centres is mostly attributed to the growing number of private cars, the improvement of public transport services can be a significant control measure. Although public transport vehicles also emit air pollutants, their contribution to pollution per person transported can be much less than that of private cars.

Improvement of public transport services should focus on means of making the service an attractive option so as to convince vehicle owners to use it. Availability of the service, physical condition of the vehicle, quality of the service, and cost are critical factors.

5.3.3.5 Other transport-related measures

The EMA should include in public education campaigns on reduction of air pollution, promotion of staggered work hours among major employers (including the Government) so as to assist in

reducing the influx and outflow of people into the city centre as they proceed to and return from work.

5.3.4 Supporting Research Measures

5.3.4.1 Vehicle Retrofit Technologies

The EMA should work with the University of the West Indies to effect research into the development of practical, effective and low-cost technologies for retrofitting the more highly polluting motor vehicles to reduce exhaust emissions.

For example, one such technology that shows some promise for retrofitting diesel-fuelled urban buses consists of using a secondary filter, which supplements the conventional cartridge-filter. This technology is claimed to reduce the particulate matter emissions by about 50 percent and costs about US \$500 (Onursal and Gautam 1997).

Replacing diesel-fuelled engines with CNG or LPG can also produce significant benefits in the commercial transportation sector.

5.3.4.2 Vehicle Carrying Capacity of the Nation-wide Road Network

Research should be conducted into the determination of the maximum number of motor vehicles that the nation-wide road network can sustain. This national quantity will be invaluable in establishing an advisory ceiling under which the total number of vehicles registered in Trinidad and Tobago consistent with the road system should be maintained. This measure will assist in relieving vehicle congestion in major urban areas, with the commensurate reduction in environmental pollution.

5.3.5 Control of Air Pollution from Other Mobile Sources

Air pollution also arises from other mobile sources such as the exhaust emissions of aircraft, and from the stacks of ships. Here, the EMA's strategy is one of working with the relevant regulatory agencies to develop controls under relevant existing legislation.

5.4 Ozone Depleting Substances

The action plan for Trinidad and Tobago and Phases I and II of the UNDP/EMA Institutional Strengthening Programme (ISP) have already defined priorities and strategies for the phase out of ODS. These include the following:

Refrigerant Management Plan: About 75 R12 recovery units were distributed to trained and refrigeration service providers to collect used R12 for reprocessing at one of three recycling centres located in Trinidad.

Mobile Air Conditioning: a similar project was implemented for automobile repair shops. Work is ongoing to improve the efficiency of both these efforts.

Halon Banking: Several existing fire suppressant systems utilise ozone-depleting halons. A bank is recommended to store halons that have been retired from use for other users who have replenishment needs. This project is being pursued in conjunction with other Caribbean countries for a regional banking system.

Restriction on imports: ODS and equipment that use ODS requires a licence before importation can proceed. This system, developed under Phase I of the ISP, will be further refined under Phase II.

While Trinidad and Tobago is not a major contributor to global ozone depletion, it must do its part in addressing this serious environmental threat. Moreover, consumers in Trinidad and

Tobago may find themselves with obsolete air conditioning, refrigeration and fire suppressant equipment as global supply of these substances gets scarce.

5.5 Priorities for Action

As a high priority, National Ambient Air Quality Standards must be legally established and a national ambient air monitoring network developed. Ambient air monitoring fulfils a central role in national air quality management, as it provides the necessary sound scientific basis for the following: policy and strategy development, objective setting, measurement of compliance against set targets, and enforcement action.

Legal standards controlling air emissions from stacks of industrial sources must be established since heavy industry has great potential to contribute significantly to air pollution. Standards for controlling fugitive emissions must also be established.

To control air pollution from the small and micro business sector, legal controls for levels of opacity, particulate matter and odour will be most effective in abating the nuisance posed by air pollution from this sector. Legal rules for the control of pollution from specific industries and codes of good environmental practice should be developed to control the following high priority industries: automotive body repair and mechanics, woodworking, service stations, food preparation establishments use of paints, solvents and other chemicals.

The support of on-going public education programmes is critical for the achievement of the overall objectives of this National Strategy.

REFERENCES

- Davis, EM and GN Melville. 1999. **Beetham Landfill Site Burning Incident: Lung function studies**. A Report prepared for the EMA.
- EMA. 1996. **State of the Environment Report**.
- EMA. 1998. **Report of the Pilot Programme on the Testing of Motor Vehicle Emissions on the Roads of Trinidad and at the Licensing Office, Port of Spain**.
- EMA. 1999. **State of the Environment Report**.
- EMA. 1999. **Vehicle Emissions Counting Exercise Report**.
- EMA. 2000. **Draft Environmental Code**.
- EMA. 2000. **Draft Initial National Communication of Trinidad and Tobago under UNFCCC**.
- EMA. 2000. **Draft National Strategy of Trinidad and Tobago for the Control of Air Pollution from Anthropogenic Sources**.
- EMA/UNDP. 1998. **Pollutant Inventory Study for Trinidad and Tobago**. Prepared for the EMA by Ecoengineering Consultants Limited.
- Godish, T. 1991. **Air Quality**. Lewis Publishers, Chelsea, MI.
- Onursal, B and S Gautam. 1997. **Vehicular Air Pollution Experiences from Seven Latin American Urban Centers**. World Bank Technical Paper No. 373.
- Rajkumar, W. 1995. **Rapid Assessment of Air Pollution in Trinidad and Tobago**. Document Prepared for The Pan American Health Organisation, Port of Spain.
- Rajkumar, W. and Siung-Chang, A. 2000. **Suspended particulate matter concentrations along the East-West Corridor, Trinidad, West Indies**. Atmospheric Environment. Vol. 34. Pp 1181-1187.
- Republic of Trinidad and Tobago. 1998. **National Environmental Policy of Trinidad and Tobago**.
- Steger, W. and J. Bowermaster. 1990. **Saving the Earth. A citizen's guide to environmental action**. Alfred A. Knopf, New York, NY.
- Town & Country Planning Division. 1999. **Assignment 2: A Consultancy Assignment to Collect Environment Baseline Data**. Component of the Business Expansion and Industrial Restructuring (BEIRL) Project. Ministry of Planning and Development, Trinidad and Tobago.
- WHO. 1999. **Air quality guidelines for Europe**. WHO Regional Publications, European Series. World Health Organisation, Regional Office for Europe, Copenhagen. <http://www.who.dk>
- World Bank. 1998. **Pollution Prevention and Abatement Handbook**. <http://wbln0018.worldbank.org/essd/essd.nsf/Docs/PPAH>