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## Think the model and



will make the software for you



# **OPTEX-GAMS-MMS**

OPTEX - Mathematical Modeling System         Control Input         Librerias       Optimización       Escenarios       General       Modelo       Problemas       Topología       Para         MODEL	n - Chief Scientist DecisionWare International Corp. (OPTEX MMS 374838-456059) ámetros   Matrix   Restricciones   Variables   Resultados   Gráficas   Tablas   Reportes   CONTROL Optimization Model/DSS   Modelo   Library   CPLEX 64 bits v12.2   Run Solver   DATA SQL   Data   Archivo Texto   Fuente Modelo   OPTEX-SIMM   Ubrars   Compiler   Programa OPTEX MMS a compilar   Programa OPTEX MMS a compilar   Programa Optice/Execute   ?   Games Madelo   Programa Compiler/Execute   ?   Correr Modelo   Programa Compiler/Execute   ?   Correr Modelo   Correr Modelo	Results Selective I Only results Selective I Only results Matrix I Variables I Constraints Last Run Results Filtering ExcELGUI Results Filtering ExcELGUI ExcEL Tables ExcEL GUI ExcEL Tables ExcEL Vorkbc Language Cubos OLAP TABLEAU CALKYEW
Usuario     Usuario     Usuario       Usuario     User OPTEX       Key     User Key OPTEX	I Generar GUI       Time (secs)       0         Parametric Optimization       Optimizacion Normal       MIP GAP (%)       10         Initial Solucion       Pre-fixed Variables       Iterations       0         Subrogation       NO Error Validacion       Iterations       0         SoS       Optimization Server       Iterations       Iterations         Server       DW Server 16 Cores - 48 G v       Timepos Conexion       Enviar         IP       4.31.168.188       Socket [5000       120       1800       Solver Remote         User       optexmms       Clave       Client       IP       0.0.0       Socket	CPU/RAM Matrix Variables Constraints [250000] [60000] [30000 Registers x Table RAM (MBytes) [10000] [128 RAM Disk Maximize Memory















OPTEX Mathematical Modeling System	
gamside: C:\Users\user\Documents\gamsdir\projdir\gmsproj.gpr - [C:\GENEX\PRORU\PRORUES\VRPMUE\A\OPTEX_VRPDGA(Sin SAVE).gms]	
Eile Edit Search Windows Utilities Model Libraries Help	_ & ×
	<b>1</b>
OPTEX_CDEM.gms OPTEX_CDEM_WD.gms OPTEX_PTP.gms OPTEX_VRPDGA(Sin SAVE).gms OPTEX_VRPDGA.gms OPTEX_CDEM.lst OPTEX_VRPDGA.lst	
	•
* OPTEX-> Conjuntos Leidos 012="SELECT COD VEH FROM VEHICULO WHERE COD VEH IN (SELECT COD VEH FROM ESC VEH)	
s12=C_VEH	
213="SELECT COD_CVE FROM CICLOS WHERE COD_CVE IN (SELECT COD_CVE FROM ESC_CVE)	
SI3=C_CIC 014="SELECT COD CVE.COD CVE1 FROM CICLOS3 WHERE COD CVE IN (SELECT COD CVE FROM ESC CVE) AND COD CVE1 IN (SELECT COD CVE1 FROM ESC CVE)	
s14=C_CP0	E
Q15="SELECT COD_VEH,COD_MUE FROM MUE_VEH WHERE COD_VEH IN (SELECT COD_VEH FROM ESC_VEH) AND COD_MUE IN (SELECT COD_MUE FROM ESC_MUE)	
916="SELECT COD EVE FROM EVENTOS WHERE COD EVE IN (SELECT COD EVE FROM ESC EVE)	
s16=C_EVE	
Q17="SELECT COD_MUE FROM MUELLES WHERE COD_MUE IN (SELECT COD_MUE FROM ESC_MUE)	
218="SELECT COD EVE, COD EVE1 FROM EVENTOS3 WHERE COD EVE IN (SELECT COD EVE FROM ESC EVE) AND COD EVE1 IN (SELECT COD EVE1 FROM ESC EVE)	
s18=C_EPO	
219="SELECT COD_MUE,COD_VEH FROM MUE_VEH WHERE COD_MUE IN (SELECT COD_MUE FROM ESC_MUE) AND COD_VEH IN (SELECT COD_VEH FROM ESC_VEH)	
220="SELECT COD NOD FROM NODOS WHERE COD NOD IN (SELECT COD NOD FROM ESC NOD)	
s20=C_CLI	
221="SELECT COD_NOD,COD_PED FROM PEDIDOS WHERE COD_NOD IN (SELECT COD_NOD FROM ESC_NOD) AND COD_PED IN (SELECT COD_PED FROM ESC_PED)	
022="SELECT COD CVE1 FROM ESC CVE WHERE COD CVE1 IN (SELECT COD CVE1 FROM ESC CVE)	
s22=C_CIA	
023="SELECT COD_MUE FROM MUE_VEH WHERE COD_MUE IN (SELECT COD_MUE FROM ESC_MUE)	
Q24="SELECT COD EVE1 FROM EVENTOS WHERE COD EVE1 IN (SELECT COD EVE1 FROM ESC EVE) GAMS	
s24=C_EVA	
225="SELECT COD_PED, COD_PRO FROM PED_PRO WHERE COD_PED IN (SELECT COD_PED AUTOMATIC GENERATION OF	
226="SELECT COD PRO FROM ESC PRO WHERE COD PRO IN (SELECT COD PROPORTING TIME ATTONI MODEL DATA MO	DEI
	DEL
* OPTEX-> Parametros Leidos SOL CONNECTIVITY	
227="SELECT COD_NOD,TVIN FROM NODOS WHERE COD_NOD IN (SELECT COD_NOD FROM ESC_NOD)"	
a27=P_TVIS	-
	•

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# **OPTEX-GAMS-MMS**

<b>P</b> 2	OPTEX - Mathematical Mod	deling System - Chief Scientist DecisionWare International Corp. (OPTEX MMS 374838-456059)	×
Control Input Libreria	as Optimización Escenarios General Modelo Problemas T	Topología Parámetros Matrix Restricciones Variables Resultados Gráficas Tablas Reportes	
MODEL			
Aplication VF	RP - Ruteo Urbano DBF	Optimization     Re	sults
Family Ru	steo Urbano con Ventanas de Tiempo (Pequeño)	Model/DSS Modelo      Library CPLEX 64 bits v12.2	Selective Only results
Scenary A-	Escenario	Execute Archivo Salida LP Algorithm	Mattix IV Vanables IV Constraints
Characterits - Model: Optimization Objetive Function	VRPTW Matrix 0 MIN Constraints 0 on MICO Variables Continues 0 Brance 0	Flun Solver     MIP Options     MIP Options     MIP Options     Postability     NO Reliaccion     Fuerte Modelo     OPTEX:SIMM     Options     Control     Contro     Control     Control     Con	Recover GIS Tables Last Run GANTT Tables EXCELGUI Results Filtering Control of the filtering Con
Horizon Initial Date Final date	// Integens 0 0 Elementa <-0 0 Constraints SOS1 0 Elementa SOS1 0	Compiler     Compiler     Programa OPTEX/MMS a compiler     Programa Compiler/Execute     2     Programa Compiler/Execute     2     Programa Compiler/Execute     2	Detailed List EXCEL Tables nguage spañol Cubos OLAP TABLEAU
- PROCESS Estructures Generation	Load Estructure 0     Load Sets 0     Load Tables 0     Program Generation 0	Cargor Modelo     Coner Modelo	DOS Window CLIKVIEW END Window XML Files MPS File
Optimization Results Recuperation	Optimization 0     Constraints 0    Variables 0	Parametric Optimization Optimization Normal  MIP GAP (%) 10 OPTIMization Normal	YU/RAM Matrix Variables Constraints
Process Fixed Text		Initial Solucion     Pre-fixed Variables     Revealed Solution     Submogation     NO Ener Validacion     Sos     Optimize     F Low Priority	250000  60000  30000 Registers x Table RAM (MBytes)
		Optimization Server         Image: Constant of	RAM Disk     Maximize Memory
ē95	Usuario User OPTEX Key User Key OPTEX Help Canc	IP         4 . 31 . 168 . 188         Socket [5000         [120         [1800         Solver Remote            cell         User         optexmma         Clave	

### **OPTEX-GAMS-MMS** services:

- SQL Connectivity
- Multi Problem / Multi Level Modeling
- Disjunctive Programming (Grossman)
- Lagrangean Relaxation
- Parallel Optimization
- SQL Connectivity
- Multi-stage Stochastic Optimization

**Entry Point for User Routines** 

- Parametric Optimization
- Tunning

GAMS











## New solution concepts

- Extended Nonlinear Programs
- Embedded Complementarity Systems
- Bilevel Programs
- Disjunctive Programs
- ...
  - Breakouts of traditional MP classes
  - No conventional syntax
  - Limited support with common model representation
  - Incomplete/experimental solution approaches
  - Lack of reliable/any software

12



### DISJUNCTIVE PROGRAMMING (GROSSMAN)

∑ <sup>×</sup> OPTEX-VF	RP - Constraints - [Constraints]			- 🗆 ×
∑ <sup>*</sup> <u>A</u> rchivo	<u>E</u> dición <u>V</u> er <u>A</u> nálisis Ver A <u>y</u> uda			_ & ×
a 🔥		<u>}</u>	🕶 🛍 💷	€ Q = 2 Z
🛄 % 🗐 🖄		<b>9</b>		
Constraint	Spanish Desc.	Туре	Value RHS	Logic Variable
CAPP	Capacidad de los Vehículos en Peso	<	CAPP	AVL
CAPV	Capacidad volumétrica de los Vehículos	<	CAPV	AVL
ENSA	Entrada y Salida del Nodo	=	0	AVL
NOCL	Ciclos no Permitidos	<	1	AVL
PLTA	Penalización por Llegada Tardía	<	HCIE	VCI
PLTE	Penalización por Llegada Temprana	>	HAPE	VCI
SANO	Salida del Nodo Origen	=	0	AVL
STIL	Secuencia de los Tiempos de Llegada	>	RPTW	VCL
TTSE	Tiempo Límite de Servicio	<	TDJO	AVL
UTVE	Utilización de Vehículos	<	0	
VCLI	Visita de Destino	>	1	
VVCI	Visita Destinos por Vehículo	=	0	
1				
				04.25.57
				04:25:57 p. m.





#### Gamside: D:\DROPBOX\GENEX\VRP\VRPES\VRP DISJUNCTIVE PROGRAMMING RPTW.gms] File Edit Search Windows Utilities Model Libraries (GROSSMAN) 🗄 🍇 💊 🗞 RNA\_ 🔹 (a) 🎒 🗈

#### OPTEX VRPTW.gms

B

```
*OPTEX-> Programacion Disyuntiva
$ONECHO > empinfo.dat
Disjuntion
    DIS AVL[v] Determina el Uso de un Vehículo
    DIS VCI[v,c] Asignación del Vehículo v al Destino c
    DIS VCL[v,c,k] Determina si un Vehículo va de un Destino a Otro
                                                               ∑<sup>*</sup> OPTEX-VRP - Constraints - [Constraints]
                                                                                                                           DIS AVL[v] is IF V AVL[v]
                                        THEN
                                                               ∑ Archivo Edición Ver Análisis Ver Ayuda
    R CAPP[v];
                                                               м м м Ш 🗉 🕘 ни и м м м м 🛍 🛍 🗈 🗶 ∽ 🛍 🎫 🔍 < 🔙 🖽 🖓
    R CAPV[v] ;
                                                               □ % □ Z Å. ☎ ≦ □ μ Σ ┖ ☵ Z ? ♠ ¶
    R ENSA[v,c] ;
    R NOCL[c,k,v];
                                                                                     Spanish Desc.
                                                                                                              Value RHS
                                                                Constraint
                                                                                                           Type
                                                                                                                         Logic Variable
    R SANO[v,c];
                                                               CAPP
                                                                         Capacidad de los Vehículos en Peso
                                                                                                              CAPP
                                                                                                                       AVL
   R TTSE[v];
                                                               CAPV
                                                                         Capacidad volumétrica de los Vehículos
                                                                                                              CAPV
                                                                                                                       AVL
                                                                                                          <
ENDIF ;
                                                               ENSA
                                                                         Entrada y Salida del Nodo
                                                                                                              0
                                                                                                                       AVL
                                                                                                          =
                                                               NOCL
                                                                                                              1
                                                                                                                       AVL
                                                                         Ciclos no Permitidos
                                                                                                          <
                                                               PLTA
                                                                         Penalización por Llegada Tardía
                                                                                                              HCIE
                                                                                                                       VCI
                                                                                                          <
DIS VCI[v,c] is IF V VCI[v,c] THEN
                                                               PLTE
                                                                                                              HAPE
                                                                                                                       VCI
                                                                         Penalización por Llegada Temprana
   R PLTA[c,v,d];
                                                               SANO
                                                                                                              0
                                                                                                                       AVL
                                                                         Salida del Nodo Origen
   R PLTE[c,v,d];
                                                               STIL
                                                                         Secuencia de los Tiempos de Llegada
                                                                                                          >
                                                                                                              RPTW
                                                                                                                       VCL
ENDIF ;
                                                               TTSE
                                                                         Tiempo Límite de Servicio
                                                                                                          <
                                                                                                              TDJO
                                                                                                                       AVL
                                                               UTVE
                                                                         Utilización de Vehículos
                                                                                                              0
                                                                                                          <
                                                               VCLL
                                                                         Visita de Destino
                                                                                                              1
DIS VCL[v,c,k] is IF V VCL[v,c,k]
                                                                                                          >
                                                    THEN
                                                                         Visita Destinos por Vehículo
   R STIL[v,c,k];
                                                               <
ENDIF ;
                                                                                                                        04:25:57 p. m.
```

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SOFFECHO



### STRUCTURED MATHEMATICAL MODEL PROGRAMS

) 📃 🗞 🔖 🗞 🖪	NA_ 💽 (a) 🏐 🕞			
TEX_MODPLAN.gms OPTE	MODPLAN.ist OPTEX_DEMO.gms OPTE	X_SCDE.gms		
*OPTEX-> Restr	iccion: Consumo Combust	ible por Nodo		
R_CCNS[t,ns]\$(	CTTT(t) and C_NTE(ns	))		
+ SUM ([C_BLO	<pre>[b] ,C_CTN[ns,g] ,C_CBT</pre>	[g,k] ],P_IPCA[k] * V_CCO[t,b,g,k]\$(C_	_TTT(t) and C_BLO(b) and C_TMCR(g) and C_CBT(g	,k) )
- SUM ([C_DGT	[sd] ],V_VCL[t,ns,sd]\$(	CTTT(t) and C_NTD(ns) and C_DTN(ns, s	d) )) =1= 0 ;	
*OPTEX-> Restr	iccion: Conservación Ma	teria Entrada Central Hidráulica con P	ondaje	
R CCP[t,p]S( C	TTT(t) and C HCP(p) )		ondayo	
+ SUM ([C BLO	[b] ], V ATU[t, p, b]\$(C	TTT(t) and C HID(p) and C BLO(b) ) )		
+ SUM ([C BLO	[b] ], V VCE[t, p, b]\$(C	TTT(t) and C HID(p) and C BLO(b) ) )		
- SUM ([C_BLO	[b] ,C_CAC[p,c] ],P ECC	C[p,c] * V_HCC[t,c,p,b]\$(CTTT(t) and	C_CAC(p,c) and C_HID(p) and C_BLO(b) ) )	
- SUM ([C_EVC	[p,m] ], P_ECVE[m] * V_V	EE[t,m]\$(CTTT(t) and C_EMB(m) ) )		
- SUM ([C_BLO	[b] ,C_KAC[p,cb] ],P_EC	<pre>KC[cb,p] * V_HKC[t,cb,p,b]\$(CTTT(t))</pre>	and C_KAN(cb) and C_AKC(cb,p) and C_BLO(b) ) )	
– SUM ([C_BLO	<pre>[b] ,C_EAC[p,m] ],P_ECE</pre>	C[m,p] * V_HEC[t,p,m,b]\$(CTTT(t) and	C_HID(p) and C_EAC(p,m) and C_BLO(b) ) ) =e= 1	P_HAT [
*OPTEX-> Restr	iccion: Conservación Ma	teria Salida Central Hidráulica		
$R_CGS[t,p,b]$ \$(	CTTT(t) and C_CEC(p)	and C_BLO(b) )		
+ SUM ([C_EBC	[p,m] ],V_HCE[t,p,m,b]\$	(C_TTT(t) and C_HID(p) and C_EBC(p,m)	and C_BLO(b) ) )	
+ SUM ([C_CBC	[p,c] ],V_HCC[t,p,c,b]\$	(C_TTT(t) and C_HID(p) and C_CBC(p,c)	and $C_{BLO}(b)$ )	
+ SOM ([C_CAK	[p,cb] ],V_HCK[t,p,cb,b	$J \in (C_TTT(t) \text{ and } C_HID(p) \text{ and } C_CAR(p, t)$	cb) and C_BLO(b) ) )	
- V_ATU[U, D, D	$13(C_{HID}(c))$ and $C_{HID}(c)$	p) and C_BLO(D) ) -e- 0 ;		
*OPTEX-> Restr	iccion: Continuidad Ene	rgia Barras - 1ra Lev Kirchhoff perdid	as Direccionadas	
R CNDF[t,z,b]\$	(C TTT(t) and C BAR(z	and C BLO(b) )		
+ SUM ([C_TBA	[z,g] ],V_GTE[t,g,b]\$(C	TTT(t) and C_TER(g) and C_BLO(b) ) )		
+ SUM ([C_HBA	[z,p] ],V_GHI[t,p,b]\$(C	TTT(t) and C_HID(p) and C_BLO(b) ) )		
+ SUM ([C_CBB	[z,f] ],V_TCC[t,b,f]\$(C	TTT(t) and C_BLO(b) and C_CIR(f) ) )		
- SUM ([C_CB2	[z,f] ],V_TCC[t,b,f]\$(C	TTT(t) and C_BLO(b) and C_CIR(f) ) )		
- V_ENR[t,z,b	]\$(CTTT(t) and C_BAD(	z) and C_BLO(b) )		
- SUM ([C_CB2	[z,f] ],V_PED[t,b,f]\$(C	TTT(t) and C_BLO(b) and C_CIR(f) ) )		
- V_EIC[t,b,z	]\$(CTTT(t) and C_BLO(	b) and C_BIC(z) )		
+ V IIC[t,b,z	<pre>l&gt;(C TTT(t) and C BLO(</pre>	<pre>o) and C BIC(z) ) =e= 0 ;</pre>		

**OPTEX** generates GAMS structured programs for each model, it is error free and easy to understand, because all description that exists in the data base are translated to the program.

The multilingual capacity of OPTEX permits description in multiple languages, then is possible to have the same model in different idioms.



OPTEX Mathematical Modeling System - Chief Scientist DecisionWare International Corp. (OPTEX MMS 374838-456059)



In October of 2013, **COES-SINAC**, (Committee for Economic Operation of the National Electricity Interconnected System of Peru) selected **DW** to develop the project "**NEW SIMULATION MODEL OF THE ECONOMIC DISPATCH OPERATION FOR THE NATIONAL PLAN OF TRANSMISSION**", which includes multiple mathematical optimization models to support the expansion of the transmission electricity network of the Republic of Peru.

The project includes simulation models of simultaneous optimum dispatch of electricity and natural gas systems and the evaluation of multiple expansion uncertainty scenarios, in order to build paretto curves that support the selection of a robust expansion plan



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                              ▼ {a}
                                     5
                                         D
OPTEX_MODPLAN.gms OPTEX_MODPLAN.lst OPTEX_DEMO.gms OPTEX_SCDE.gms
  *OPTEX-> Indices Alias
                                                     ALIAS INDEXES
  ALIAS (t,TT) ;
  ALIAS (ht,pt) ;
                                                     DECLARATIONS
  ALIAS (t,q,TT) ;
  ALIAS (ns, an) ;
  ALIAS (b, bl) ;
  ALIAS (p,c) ;
  ALIAS (m, n) ;
  ALIAS (cb,bc) ;
  ALIAS (f, ff) ;
  ALIAS (V,VV) ;
  SET set HPL(TT,t) Mapeo de Conjunto en t-TT
  $include C HPL.opt
  / ;
   *OPTEX-> Include MOD ##POSIND##
   *OPTEX-> Include PRO MODPLAN ##POSIND##
   *OPTEX-> Parametros Formulas Proyeccion
  PARAMETERS
  PP DIAS[t] Dias periodo t
  $include PF DIAS.opt
  PP HORAS[t] Horas periodo t
<
    190: 132 Modified
```



190: 132 Modified



```
SET C_SHR(hr) Escenario Redespacho
/
```

```
$include C_SHR.opt
/ ;
```

```
SET C_NTE(ns) Nodos en la Red de Gasoductos
```

```
$include C_NTE.opt
/ ;
```



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RVA\_EQE[t,m,hc,od,hh,ht,hr] , RME\_EQE[t,m] , RMX\_EQE[t,m] , RMN\_EQE[t,m] , RDS\_EQE[t,m] RVA\_GBIO[t,g,hc,od,hh,ht,hr] , RME\_GBIO[t,g] , RMX\_GBIO[t,g] , RMN\_GBIO[t,g] , RDS\_GBIO[t,g] RVA\_GCF[t,p,b,hc,od,hh,ht,hr] , RME\_GCF[t,p,b] , RMX\_GCF[t,p,b] , RMN\_GCF[t,p,b] , RDS\_GCF[t,p,b] RVA\_GEOL[t,b,g,hc,od,hh,ht,hr] , RME\_GEOL[t,b,g] , RMX\_GEOL[t,b,g] , RMN\_GEOL[t,b,g] , RDS\_GEOL[t,b,g] RVA\_GSOL[t,b,g,hc,od,hh,ht,hr] , RME\_GSOL[t,b,g] , RMX\_GSOL[t,b,g] , RMN\_GSOL[t,b,g] , RDS\_GSOL[t,b,g] RVA\_GTE[t,g,b,hc,od,hh,ht,hr] , RME\_GTE[t,g,b] , RMX\_GTE[t,g,b] , RMN\_GTE[t,g,b] , RDS\_GTE[t,g,b] RVA\_MWT[t,g,b,hc,od,hh,ht,hr] , RME\_MWT[t,g,b] , RMX\_MWT[t,g,b] , RMN\_MWT[t,g,b] , RDS\_MWT[t,g,b] RVA\_ON\_CHI[p,hc,od,hh,ht,hr] , RME\_ON\_CHI[p] , RMX\_ON\_CHI[p] , RMN\_ON\_CHI[p] , RDS\_ON\_CHI[p] RVA\_ON\_CTE[g,hc,od,hh,ht,hr] , RME\_ON\_CTE[g] , RMX\_ON\_CTE[g] , RMN\_ON\_CTE[g] , RDS\_ON\_CTE[g] RVA\_ON\_EMB[m,hc,od,hh,ht,hr] , RME\_ON\_EMB[m] , RMX\_ON\_EMB[m] , RMN\_ON\_EMB[m] , RDS\_ON\_EMB[m] RVA\_PELC[t,b,f,hc,od,hh,ht,hr] , RME\_PELC[t,b,f] , RMX\_PELC[t,b,f] , RMN\_PELC[t,b,f] , RDS\_PELC[t,b,f] RVA\_PRH[t,p,b,hc,od,hh,ht,hr] , RME\_PSRH[t,p,b] , RMX\_PSRH[t,p,b] , RMN\_PSRH[t,p,b] , RDS\_PSRH[t,p,b]

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\*OPTEX-> Restriccion: Conservación Materia Salida Central Hidráulica

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OPTEX Mathematical Modeling System	
gamside: D:\Dropbox\GENEX\COES\SHTGES-EXP\MODPLA\PE\OPTEX_MODPLAN.gpr - [d:\Dropbox\GENEX\COES\SHTGES-EXP\MODPLA\PE\OPTEX_M  File Edit Search Windows Utilities Model Libraries Help  RNA_  (a)  (b)	ODPLAN.gms]
OPTEX_MODPLAN.gms OPTEX_MODPLAN.lst OPTEX_DEMO.gms OPTEX_SCDE.gms	
*OPTEX-> Paralelo Estocastico	
MODEL MODPLAN / RFO_OPTEX, RFO_XOON, RFO_XCBT, RFO_XGAS, RFO_XIEX, RFO_XOPE, RFO_XPE	H, RFO_XREL, RFO_XTCC, R_CCNS
*OPTEX - Allas - Conjuntos -> Loops	TONG
ALIAS (od,od_od) ;	IONS
ALIAS (ht, ht_ht) ; FOR	
ALIAS (hc, hc_hc) ;	
ALIAS (hh, hh_hh); PARALLEL SIUCH	ASTIC MUDEL
<pre>SETS CSOD(od_od) CSHT(ht_ht) CSHC(hc_hc) CSHR(hr_hr) ; CSOD(od) = yes\$(CDIM_od(od)) ; CSHR(ht) = yes\$(CDIM_ht(ht)) ; CSHT(ht) = yes\$(CDIM_ht(ht)) ; CSHC(hc) = yes\$(CDIM_hc(hc)) ; CSHH(hh) = yes\$(CDIM_ht(hh)) ; CSHR(hr) = yes\$(CDIM_ht(hr)) ; </pre>	
<pre>ralameters &lt;</pre>	
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OPTEX_MODPLAN.gms OPTEX_MODPLAN.lst OPTEX_MODPLAN_CE.gms OPTEX_MODPLAN_WC.gms OPTEX_MODPLAN_WD.gms OPTEX_MODPLAN_WE.gms OPTEX_MODPLAN_WH.gms
   *OPTEX-> Include MOD MODPLAN ##PRESOL##
   *OPTEX-> Include MOD MODPLAN ##NEWSOL##
   C\_DIM_od(od) = no;
                                                                                           LOOPS FOR GENERATE THE
   Loop (C SOD(od),
   if (on SUB Loop > 0 ,
                                                                                       PROBLEM FOR EACH SCENARIO
         C DIM_od(od) = yes ;
        P_DBME[t,z,b]$(C_TTT(t)) = ( + SUM([C_SBA[z,si],C_SOP[od,hp],C_SODD[od,hd]],P_PBDE[t,z,b,hd,hp]
        P HT CRE2[v] = +1 * P R HT CRE2[v,od];
        P_HT_CHI[p] = + 1 * P_R_HT CHI[p,od] ;
        P_HT_CTE[g] = +1 * P_R_HT_CTE[g,od];
        P_HT_EMB[m] = + 1 * P_R_HT_EMB[m,od] ;
        P ON CHI[p] = + P HT CHI[p] * 100000000 ;
        P ON CTE[g] = + P HT CTE[g] * 100000000 ;
        P_{ON}_{EMB}[m] = + P_{HT}_{EMB}[m] * 100000000 ;
        P_{DSGHE}[t,b,z] (C_{TTT}(t)) = ( + SUM([C_{HBA}[z,p], C_{SODD}[od,hd], C_{SOP}[od,hp]], P_{FB}[t,z,b] (C_{TTT}(t)) = ( + SUM([C_{HBA}[z,p], C_{SODD}[od,hd], C_{SOP}[od,hp]]), P_{FB}[t,z,b] (C_{TTT}(t)) = ( + SUM([C_{HBA}[z,p], C_{SODD}[od,hd], C_{SOP}[od,hp]]), P_{FB}[t,z,b] (C_{TTT}(t)) = ( + SUM([C_{HBA}[z,p], C_{SODD}[od,hd], C_{SOP}[od,hp]]), P_{FB}[t,z,b] (C_{TTT}(t)) = ( + SUM([C_{HBA}[z,p], C_{SODD}[od,hd])), P_{FB}[t,z,b] (C_{TTT}(t))) = ( + SUM([C_{HBA}[z,p], C_{SODD}[od,hd])), P_{FB}[t,z,b] (C_{TTT}(t))) = ( + SUM([C_{HBA}[z,p], C_{SODD}[od,hd])), P_{FB}[t,z,b] (C_{TTT}(t))) = ( + SUM([C_{HBA}[z,p], C_{SODD}[od,hd])), P_{FB}[t,z,b] (C_{TTT}(t)))
        P_TCDE[t,z,b,d]$(C_TTT(t)) = ( + P_CTDE[d] * P_DBBE[t,z,b]$(C_TTT(t)) ) * 1;
        V DEF.up[t,z,d,b] = P TCDE[t,z,b,d](C TTT(t));
        Display P DBME, P HT CRE2, P HT CHI, P HT CTE, P HT EMB, P ON CHI, P ON CTE, P ON EMB, P VFFE, P DSGH
         C DIM ht(ht) = no;
   Loop ( C SHT(ht) ,
   if (on SUB_Loop > 0 ,
                 C DIM ht(ht) = yes ;
        P HT CRE1[v,hp] = + 1 * P R HT CRE1[v,hp,ht] ;
        P_HT_CRE[v] = ( + SUM([C_SOP[od, hp]]) OPTEX AUTOMATICALLY GENERATE
        P SPCTB[t,b,v]$(C TTT(t)) = ( ( + P HT CRE[v]
                                                                                                                               PHT CRE2[v] * PS
                                                              THE PRE AND THE POST PROCESSING
        Display P_HT_CRE1, P_HT_CRE OF THE PARAMETERS AND SETS OF EACH SCENARIO.
C DIM hc(hc) = no; OF THE PARAMETERS AND SETS OF EACH SCENARIO.
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OPTEX_MODPLAN.gms OPTEX_MODPLAN.lst OPTEX_DEMO.gms OPTEX_SCDE.gms
*OPTEX-> Salvar Resultados
$VVA\_CCO[t,b,g,k,hc,od,hh,ht,hr] = V\_CCO.1[t,b,g,k];$
<pre>VVA_VCL[t,ns,sd,hc,od,hh,ht,hr] = V_VCL.l[t,ns,sd] ;</pre>
$VVA\_ATU[t,p,b,hc,od,hh,ht,hr] = V\_ATU.1[t,p,b];$
$VVA_VCE[t,p,b,hc,od,hh,ht,hr] = V_VCE.l[t,p,b];$
VVA_VEE[t,m,hc,od,hh,ht,hr] = V_VEE.1[t,m]; STORING RESULTS FOR FACH PROBLEM
VVA_HKC[t,cb,p,b,hc,od,hh,ht,hr] = V_HKC.1[t,cb,p,b];
<pre>VVA_HEC[t,p,m,b,hc,od,hh,ht,hr] = V_HEC.1[t,p,m,b] ; FOR</pre>
<pre>VVA_HCE[t,p,m,b,hc,od,hh,ht,hr] = V_HCE.1[t,p,m,b] ;</pre>
VVA_HCC[t,p,c,b,hc,od,hh,ht,hr] = V_HCC.1[t,p,c,b] <b>PARALLEL/DISTRIBUTED SOLUTION</b>
$VVA_HCK[t,p,cb,b,hc,od,hh,ht,hr] = V_HCK.l[t,p,cb,b];$
<pre>VVA_GTE[t,g,b,hc,od,hh,ht,hr] = V_GTE.l[t,g,b] ;</pre>
$VVA_GHI[t,p,b,hc,od,hh,ht,hr] = V_GHI.l[t,p,b];$
$VVA\_TCC[t,b,f,hc,od,hh,ht,hr] = V\_TCC.l[t,b,f];$
$VVA\_ENR[t,z,b,hc,od,hh,ht,hr] = V\_ENR.l[t,z,b];$
$VVA\_PED[t,b,f,hc,od,hh,ht,hr] = V\_PED.l[t,b,f];$
$VVA\_EIC[t,b,z,hc,od,hh,ht,hr] = V\_EIC.1[t,b,z];$
$VVA_{IIC[t,b,z,hc,od,hh,ht,hr]} = V_{IIC.l[t,b,z]};$
$VVA_VFE[t,m,hc,od,hh,ht,hr] = V_VFE.1[t,m];$
$VVA_SQE[t,m,hc,od,hh,ht,hr] = V_SQE.1[t,m];$
VVA_EQE[t,m,hc,od,hh,ht,hr] = V_EQE.1[t,m];
VVA_VFB[t,m,b,hc,od,hh,ht,hr] = V_VFB.1[t,m,b];
VVA_HKE[t,cb,m,hc,od,hh,ht,hr] = V_HKE.1[t,cb,m];
VVA_HEE[t,m,n,hc,od,hh,ht,hr] = V_HEE.1[t,m,n];
VVA_HEK[t,m,cb,nc,od,nn,nt,nr] = V_HEK.1[t,m,cb];
VVA_VEB[t,m,b,nc,od,nn,nt,nr] = V_VEB.1[t,m,b];
VVA_EVP[t,m,nc,od,nn,nt,nr] = V_EVP.1[t,m];
<pre>VVA_HAR(U, CD, DC, HC, OQ, HH, HU, HT] = V_HAR.I[U, CD, DC];</pre>
$VVA_VER[c, cb, nc, od, nn, nc, nr] = V_VER. [c, cb];$ $WVA_UPT[t, cb, dv, bc, od, bb, bt, br] = V_UPT [[t, cb, dv]];$
$VVA_m(r(r), cb), ax, nc, od, nn, nc, nr) = V_m(r, r(r), cb), ax $
<pre></pre>







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l	*0) Pa	PTEX-> Calculo	Estadisticas			CALCU	<b>JLATING</b>	<b>STATISTI</b>	<b>CS</b>
	1	nDIMs ; nDIMs =	card(C_SHC)	* <b>card</b> (CSOI	0) * <b>card</b> (CS	HH) * card(C_SH		JDE)	
		<pre>/ME_CCO[t,b,g,k /MX_CCO[t,b,g,k /MN_CCO[t,b,g,k /MN_CCO[t,b,g,k /ME_VCL[t,ns,sd /MX_VCL[t,ns,sd /MX_VCL[t,ns,sd /MN_VCL[t,ns,sd /MN_VCL[t,ns,sd /ME_ATU[t,p,b] /MX_ATU[t,p,b] /MN_ATU[t,p,b] /MN_ATU[t,p,b] /MS_ATU[t,p,b] /MS_ATU[t,p,b] /MS_VCE[t,p,b] /MS_VCE[t,p,b] /MN_VCE[t,p,b] /MS_VCE[t,p,b] /MS_VCE[t,m] = /MX_VEE[t,m] = /MN_VEE[t,m] = /MS_VEE[t,m] = /ME_HKC[t,cb,p, /MN_HKC[t,cb,p,</pre>	<pre>:] = SUM ((C_S); :] = SMAX ((C_S); :] = SMIN ((C_S); :] = SMIN ((C_S); :] = SMIN ((C_S); !] = SMAX ((C_S); !] = SMIN ((C_S); !] = SMIN ((C_S); !] = SMIN ((C_S); !] = SMIN ((C_S); :] = SMIN</pre>	HC (hc), CSOD SHC (hc), CSOI SHC (hc), CSOI SHC (hc), CSOI SHC (hc), CSOI SHC (hc), CSOI SHC (hc), CSOI (hc), CSOD (oc C (hc), CSOD (oc SID (hc), CSOI (oc) SHC (hc), C	(od), CSHH (hh D (od), CSHH (hh D (od), CSHH (h D (od), CSHH (hh), D (od), CSHH (hh), C D (cd), CSHH (hh), C D (od), CSHH (hh), C D (od), CSHH (hh), C D (od), CSHH (hh), C D (od), CSHH (hh),	),CSHT(ht),C h),CSHT(ht),C_ h),CSHT(ht),C_ h),CSHT(ht),C_ h),CSHT(ht),C_ h),CSHT(ht),C_ h),CSHT(ht),C_ h),CSHT(ht),CSH ,CSHT(ht),CSH ,CSHT(ht),CSH ,CSHT(ht),CSH ,CSHT(ht),CSH ,CSHT(ht),CSH ,CSHT(ht),CSH ,CSHT(ht),CSH ,CSHT(ht),CSH ,CSHT(ht),CSH ,CSHT(ht),CSH ,CSHT(ht),CSHF ,SHT(ht),CSHF (ht),CSHF (ht),CSHT(ht),CSHF h),CSHT(ht),CSHF h),CSHT(ht),CSHT h),CSHT(ht),CSHF h),CSHF (ht),CSHF h),CSHF (ht),CSHF h),CSHF (ht),CSHF h),CSHF (ht),CSHF h),CSHF (ht),CSHF h),CSHF (ht),CSHF h),CSHF (ht),CSHF h),CSHF (ht),CSHF (ht),CSHF h),CSHF (ht),CSHF (ht)	SHR (hr) ), _SHR (hr) ), _SHR (hr) ), _SHR (hr) ), SHR (hr) ),	VVA_CCO[t,b,g, VVA_CCO[t,b,g, VVA_CCO[t,b,g, VVA_CCO[t,b,g, VVA_CCO[t,b,g, VVA_VCL[t,ns,s, VVA_VCL[t,ns,s, VVA_VCL[t,ns,s, VVA_VCL[t,ns,s, VVA_VCL[t,ns,s, VVA_VCL[t,ns,s, VVA_VCL[t,ns,s,s, VA_VCL[t,ns,s,s,s,s,s,s,s,s,s,s,s,s,s,s,s,s,s,s	k, hc, od, l j, k, hc, od, j, k, hc, od, id, hc, od, id, hc, od, id, hc, od, id, hc, od, sd, hc, od, sd, hc, od, ic, od, hh, h ic,
	7 7 7	/DS_HKC[t,cb,p, /ME_HEC[t,p,m,b /MX_HEC[t,p,m,b /MN_HEC[t,p,m,b	$b] = SMIN((C_{5})) = SMIN((C_{5})) = SMAX((C_{5})) = SMAX((C_{5})) = SMIN((C_{5})) = SMIN((C$	_SHC(hc),C_S( HC(hc),C_SOD SHC(hc),C_SOI SHC(hc),C_SOI	DD(od),CSHH( (od),CSHH(hh D(od),CSHH(h D(od),CSHH(h	hh),CSHT(ht),C ),CSHT(ht),C_ h),CSHT(ht),C_ h),C_SHT(ht),C	<pre>SHR(hr) ), SHR(hr) ), SHR(hr) ), SHR(hr) ), SHR(hr) ),</pre>	, VVA_HKC[t,ck VVA_HEC[t,p,m, VVA_HEC[t,p,m VVA_HEC[t,p,m	),p,b,hc, b,hc,od,l a,b,hc,od a,b,hc,od
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