In-house Training Workshop on "Household Demand Analysis"

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Steps for demand



Create new area

)		
	New Area				
	Name: New Freedodia				
	Create area:				
	Irom default data				
:: Key 10 🚔	o as a copy of area:	New Freedodia 👻			
	Password Protection (Optional)				
	Enter password:				
	Confirm password:				
	Required to Change	Required to Open			
	🗸 ок	Cancel ? Help			

Set basic parameters

Set the base year and end year

Basic Parameters				
Scope Years Default Units Calculations Loads Internet Stocks Folders Script Security Optimization				
Base Year: 2010 🛬 (First calculated year)				
First Scenario Year: 2011 🛒 (First year in which scenario expressions used)				
End Year: 2040 👻 (Last calculated year)				
Results Every: 1 years (must=1 for cost and stock turnover analyses)				
Monetary Year: 2010 🛒 (Year to which all costs are discounted)				
First Depletion Year: 2011 🛒 (First year in which reserves are depleted)				
Count Costs to End Year				
Last Year to Count Costs: 2040 🛒 (costs after this year will be ignored)				
Default Time-Series Years:				
1. 2040 2. 3. 4.				
Close 🧳 Help				

Create current account

- Go to "Key Assumptions"
- Create key assumptions
 - オ Income
 - Population
 - Household Size
 - Households
 - **7** GDP
 - Income Growth_Rate
 - Pop Growth_Rate
 - End Year Urbanization

Add Bran	ch Under Key Assumptions	X		
Name:	Income			
Branch	Type:			
	○ Category			
K	Key Assumption			
	Units: Thousand 👻 Dollars			
	Time sliced?			
V OK				

Create current account (cont')

↗ In the year 2010

- Income 3 Thousand Dollars
- Population Households[Million Households] * Household Size[People]
- Households 8 Million Households
- GDP
 Population{Million People] * Income[Thousand Dollars]
- Pop Growth_Rate 2.5%
- End Year Urbanization 45%

Branch: All Branches
Variable: Activity Level
Scenario: Current Accounts
Key Assumptions

Key Assumptions: Macroeconomic, demographic or other variables not entered elsewhere. [Default="0"] 🥡					
Branch	Expression	Scale	Units	*	
Income	3	Thousand	Dollars		
Population	Households[Million Households] * Household Size[People]	Million	People		
Household Size	5		People		
Households	8	Million	Households		
GDP	Population[Million People] * Income[Thousand Dollars] ?calculated BY definition	Billion	US\$		
Income Growth_F	ate 3.5	_	%		
Pop Growth_Rate	25	E	%		
End Vear Urbaniz	tion 45		%		

Create demand folder

- Create category branch named "Household" under "Demand" folder by using "+" command
- Then, create folders named "Urban" and "Rural" under "Household" folder





Current account: Households

Freedonia's 40 million people are living in about 8 million households. 30% of these are in urban areas.

7	Activity Level				
Activity Level: A measure of the social or economic activity for which energy is consumed. [Default="0"]					
	Branch	Expression	Scale	Units	Per
	Household	8	Million	Household	
	Urban	30	Percent	Share	of Households
۲	Rural	Remainder(100)	Percent	Share	of Households

Current account: Urban and rural household demand

Urban

Rural

7	All of Freedonia's urban residents are connected to the electric grid, and use electricity for lighting and other devices.	7
7	95% have refrigerators, which consume 500 KWh per year on average.	7
7	The average urban household annually consumes 400 KWh for lighting.	7
7	Other devices such as VCRs, televisions, and fans annually consume 800 KWh per urban household.	7
7	30% of Freedonia's urban dwellers use electric stoves for cooking: the remainder use natural gas stoves. All households have only one type of cooking device.	7

The annual energy intensity of electric stoves is 400 KWh per household, for natural gas stoves it is 60 cubic meters per household.

- Only 25% of rural households have access to grid-connected electricity.
- 20% of the electrified rural households own a refrigerator, which consumes 500 KWh per year on average.
- All electrified rural households use electricity for lighting, which consumes 335 KWh per household.
- 20% of these households also use kerosene lamps for additional lighting, using about 10 liters per year.
- Other electric devices (TV, radio, fans, etc.), account for 111 KWh per household per year.
- Non-electrified households rely exclusively on kerosene lamps for lighting, averaging 69 liters consumption per household per year

Cooking in Rural Freedonia					
	% Share of Rural HH	Energy Intensity per Household			
Charcoal Stove	30%	166 Kg			
LPG Stove	15%	59 Kg			
Wood	55%	525 Kg			

Current Account: Urban and rural household demand

- Create folder "Electrified" under Urban folder
- Then, create another two folders named "Electrified" and "Non Electrified" under Rural folder



Current Account: Urban and rural household demand

- Urban: create folder under "Electrified folder" named
 - **オ** Refrigerator
 - オ Lighting
 - Other Uses
 - Cooking
- **Rural**:
 - Electrified: do the same thing as Urban
 - Non electrified, there are only Lighting and Cooking folder



Current Account: Urban household

オ Activity Level

- All of Freedonia's urban residents are connected to the electric grid, and use electricity for lighting and other devices.
- **7** 95% have refrigerator
- 100% have lighting, other uses and cooking

Activity Level De	mand Cost All Variables			
Activity Level: A n	neasure of the social or economic	activity for which energy is consumed	l. [Default="0"]	0
Branch	Expression	Scale	Units	Per
Household	8	Million	Household	
Urban	30	Percent	Share	of Households
Electrified	100	💽 Percent	Saturation	of Households

Activity Level Demand Cost All Variables

Activity Level: A measure of the social or economic activity for which energy is consumed. [Default="0"] 🥡

	Branch	Expression	Scale	Units	Per
	Household	8	Million	Household	
	Urban	30	Percent	Share	of Households
	Electrified	100	Percent	Saturation	of Households
Þ	Refrigeration	95 🔳	Percent	Saturation	of Households
	Lighting	100	Percent	Saturation	of Households
	Other Uses	100	Percent	Saturation	of Households
	Cooking	100	Percent	Saturation	of Households

Current Account: Urban household

- Activity level
 - Create technology icon for each folder
 - オ Refrigerator and Lighting
 - **オ** Existing
 - Cooking
 - Image: Second second
 - ↗ Natural Gas Stoves Remainder(100)
 - - 🛪 All



Current Account: Urban household

オ Activity Level: Electrified

Name	Activity Level	Final Energy Intensity
Refrigerator Existing	95% Saturation	500 kWh
Lighting Electric	100% Saturation	400 kWh
Cooking Electric Stove NG Stoves	30% Share Remainder(100) Share	400 kWh 60 Cubic Meter
Other Uses All	100 % Saturation	800 kWh
News Image: Constraint of the second of t	S Manage Scenarios 4 4 4 Branch: All Branche • Variab Activity Lovel Final Energy Inter Final Energy Intensity: Annual Fin Branch Fuel	Branch Demand Household Urban Electrified Cooling Electric Stoves de Froit Foreig Intensity () Secondo: Current Accounts () etity () Environmental Loading () Al Vanables al consumption of energy per unit of extinity level (Defaulte (0)) () Expression Scale Units Per
Result:	tor 25 Check as You Type Check as You Type	y 400 Kilowatt-Hour per-Household Sas 60 Cubic Meter per-Household © Note:] III Externation @ Help stew. Ø] → Exerch/Variable. 7- Function > Time Series ↓ Smooth Kim

Current Account: Rural household

Create technology icon for each folder

- - オ Refrigerator
 - オ Existing
 - オ Lighting

 - Kerosene
 - **7** Cooking
 - Charcoal Stove
 - LPG Stoves
 - Wood Stoves
 - Other uses
 - 🛪 All



Current Account: Rural household

- Create technology icon for each folder
 - Non Electrified
 - オ Lighting
 - Kerosene
 - **7** Cooking
 - Charcoal Stove
 - オ LPG Stoves
 - → Wood Stoves



Current Account: Rural household

- オ Activity level
 - **↗** Electrified
 - Non Electrified

25% share Remainder(100)

7	Activity Level Deman	d Cost All Variables			
Activity Level: A measure of the social or economic activity for which energy is consumed. [Default="0"]					
	Branch	Expression	Scale	Units	Per
	Household	8	Million	Household	
	Rural	Remainder(100)	Percent	Share	of Households
Þ	Electrified	25	🔃 Percent	Share	of Households
	Non Electrified	Remainder(100)	Percent	Share	of Households

Current Account: Rural household

Activity Level: Electrified

Name	Activity Level	Final Energy Intensity
Refrigerator Existing	20% Saturation	500 kWh
Lighting Electric Kerosene	100% Saturation 20% Saturation	335 kWh 10 Liter
Cooking Charcoal Stove LPG Stoves Wood Stoves	30% Share 15% Share Remainder(100)	166 kg 59 kg 525 kg
Other Uses All	100 % Saturation	111 kWh

Current Account: Rural household

Activity Level: Non Electrified

Name	Activity Level	Final Energy Intensity
Lighting Kerosene	100% Saturation 100% Share	69 Liter
Cooking Charcoal Stove LPG Stoves Wood Stoves	100% Saturation 30% Share 15% Share Remainder(100) Share	166 kg 59 kg 525 kg

Reference Scenario

- Create reference scenario
 - Click "Manage Scenarios" botton
 - Add Scenario named "Reference" and the abbreviation "REF"

Manage Scenarios		de Add - Delete M ⁴ Bename - Dup Current Accounts	slicere 🕆 🖶 🗁 Pint 🚺 Key Parans 💽 Template 🗠 Internance (M)
+ Add - Delete III Service II Delete Current Accounts	Confident	- IS MINICASING	Intercore Notes
	Notes		
	Add Scenarin Under "Curriert Acc., with		
	Cancel		
		Nexults will be shown for checked metanos Undeck to reduce calculation time	
		All None	Close 2 Hdp

Reference Scenario

The number of households is expected to grow from 8 million in the year 2010 at 3% per year.



Check key assumptions

Current Account and Reference Scenario

- C Key Assumptions	Key Assumptions								
-🔟 Income	Key Assumptions: Ma	Key Assumptions: Macroeconomic, demographic or other variables not entered elsewhere. [] 🥝							
- 🛚 Population	Branch	Scenario	Expression	Scale	Units	^			
- Mousehold Size	Income	Current Accounts	5	Thousand	Dellar				
- Kouseholds	income	Reference	Growth/Income Growth Rate/%1/100)	Thousand	Dollars				
-K GDP	Population	Current Accounts	Households[Million Households] * Household Size[People]	Million	People				
Income Growth Rate		Reference	Households[Million Households] * Household Size[People]	Million	People				
	Household Size	Current Accounts	5		People				
- Pop Growth_Rate		Reference	5		People				
End Year Urbanization	Households	Current Accounts		Million	Households				
Con Film in		Reference	Growth(Pop Growth_Rate[%]/100)	Million	Households				
Effects	GDP	Current Accounts	Population[Million People] * Income[Thousand Dollars]	Billion	US\$				
🗉 🗁 Demand		Reference	Population[Million People] * Income[Thousand Dollars]	Billion	US\$				
~	Income Growth_Rate	Current Accounts	3.5		%				
		Reference	3.5		%				
Resources	Pop Growth_Rate	Current Accounts	2.5		%				
Non Energy		Reference	2.5		%				
Non Energy	End Year Urbanizatio	n Current Accounts	45		%				
Indicators		Reference	45		%				

Reference Scenario: Urban household

→ By 2040, 45% of Freedonia's households will be in urban areas.

7 Type "Interp(2040, 45)" → Interp(end year value, value)

1 🗣 🚰 💠 🗕 🚯 🛃 😂	S Manage Scer	narios 🛛 💠 🔶 Branch: D	emand\Household\				
🚞 Freedonia	Branch: All Branches 👻 Variable: Activity Level 🐨 Scenario: Checked Scenarios 🐨						
🗉 🛅 Key Assumptions	Activity Level Demand Cost All Variables						
🖲 🛅 Effects	Activity Level: A	measure of the social or ec	onomic activity for which energy is consumed. [] 🥥				
Demand	Branch	Scenario	Expression	Scale	Units	Per	
Gorden Control G	Urban Rural	Current Accounts Reference Current Accounts Reference	30 Interp(2040,45) Remainder(100) Remainder(100)	Percent Percent Percent Percent	Share Share Share Share	of Households of Households of Households of Households	
e	Check as You Ty Chart Ta Show: Activity Le	ype Ible 📴 Builder 🚫 Notes evel 👻	Elaboration 🤡 Help				

Reference Scenario: Urban household

- Increased preference for electric stoves results in a 55% market share by 2040.
 - **7** Type "Interp(2040, 55)
- The energy intensity of electric and gas stoves is expected to decrease by half a percent every year due to the penetration of more energy-efficient technologies.

1	Activity Level	Final En	ergy Intensity	Deman	d Cost	Environmental Loading	All Variables		
Activity Level: A measure of the social or economic activity for which energy is consumed. [] 🥑									
	Branch		Scenario		Expres	sion			
•	Electric Stoves Current Accounts Reference		unts	30 Interp(2040, 55)					
Natural Gas Stoves Current Accounts Reference		unts	Remai Remai	nder(100) nder(100)					

Activity Level Final E	nergy intensity Dema	and Cost All Vari	ables
Final Energy Intensity:	Annual final consum	ption of energy pe	er unit of activity level. [] 🕜
Branch	Scenario	Fuel	Expression
Electric Stoves	Current Accounts Reference	Electricity Electricity	400 Growth(-0.5%)
Natural Gas Stoves	Current Accounts Reference	Natural Gas Natural Gas	60 Growth(-0.5%)

オ Type "Growth(-0.5%)

Reference Scenario: Urban household

- The energy intensity of electric and gas stoves is expected to decrease by half a percent every year due to the penetration of more energy-efficient technologies.
- → Type "Growth(-0.5%)

A	ctivity Level	Final Energy Intensity		Deman	d Cost	All Variabl	es
Final Energy Intensity: Annual final consumption of energy per unit of activity level. [] 😨							
	Branch		Scenario		Fuel		Expression
Þ	Electric Stove	5	Current Accor Reference	unts	Electric Electric	ity ity	400 Growth(-0.5%)
	Natural Gas S	otoves	Current Accor Reference	unts	Natura Natura	l Gas I Gas	60 Growth(-0.5%)

Reference Scenario: Urban household

- As incomes rise and people purchase larger appliances, annual refrigeration intensity increases to 600 kWh per household by 2040.
- Similarly, annual lighting intensity increases to 500 kWh per household by 2040
- The use of other electricityusing equipment grows rapidly, at a rate of 2.5% per year.

Activity Level Final	Energy Intensity		
Final Energy Intensit	ty: Annual final consur	mption of energy	per unit of activity level. [] 🥝
Branch	Scenario	Fuel	Expression
Existing	Current Accounts Reference	Electricity Electricity	500 Interp(2040, 600)
Activity Level Final	Energy Intensity		
Final Energy Intensity	: Annual final consun	nption of energy	per unit of activity level. [] 🕜
Branch	Scenario	Fuel	Expression
Existing	Current Accounts Reference	Electricity Electricity	400 Interp(2040, 500)
Activity Level Final E	inergy Intensity		
Final Energy Intensity	: Annual final consump	tion of energy pe	r unit of activity level. [] 🕜
Branch	Scenario	Fuel	Expression
Existing	Current Accounts Reference	Electricity Electricity	800 Growth(2.5%)

Reference Scenario: Rural household

- An ongoing rural electrification program is expected to increase the percentage of rural households with electricity service to 28% in 2020 and 50% in 2040.
 - Type "Interp(2020, 28, 2040, 50)



Reference Scenario: Rural household

- As incomes increase, the energy intensity of electric lighting is expected to increase by 1% per year.
- The number of grid-connected rural homes using a refrigerator is expected to increase to 40% in 2020, and 66% in 2040.
- Due to rural development activities the share of various cooking devices in all households (both electrified and nonelectrified) changes
 - by 2040, LPG stoves are used by 55% of households, and
 - charcoal stoves by 25%. The remaining rural households use wood stoves.

Branch	Branch Scenario Fuel		Expression		
• Electric Kerosene	Current Accour Reference Current Accour Reference	nts Electricity Electricity its Kerosene Kerosene	7 335 7 Growth(1%) 10 10		
Activity Level	Demand Cost	All Variables	nomic activity for which energy		
Branch	Scenar	io	Expression		
Lighting	Curren Refer	t Accounts ence	100 100		
Other Uses	Curren Refer	t Accounts ence	100 100		
Cooking	Curren Refer	t Accounts ence	100 100		
Refrigeration	Curren Refer	t Accounts ence	20 Interp(2020, 40, 2040, 66)		
Activity Level	Final Energy I	intensity Der	mand Cost All Variables		
Activity Level:	A measure of	the social or e	economic activity for which er		
Branch	Scer	ario	Expression		
Charcoal Sto	ve Curr Re	ent Accounts ference	30 Interp(2040, 25)		
LDG Stove	Curr	ent Accounts	15		

Reference

Reference

Current Accounts

Wood Stove

Interp(2040, 55)

Remainder(100) Remainder(100)

Activity Level Final Energy Intensity Domand East Environmental Loading All Variables Final Energy Intensity: Annual final consumption of energy per unit of activity level. [] 🤕

View the results





Thank you

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